

**ORDINANCES  
AND OUTLINES OF TESTS,  
SYLLABI AND COURSES OF READING**

**FOR**

**BACHELOR OF COMPUTER APPLICATIONS (B.C.A)**

**(SEMESTER SYSTEM)**

**PART-I**

**(Semester Ist and IInd)**

**FOR  
2013-14, 2014-15 & 2015-16 SESSIONS**

PUNJABI UNIVERSITY,  
PATIALA – 147 002

**ORDINANCES**  
**(FOR B.C.A. UNDER THE +3 SCHEME)**  
*Applicability of Ordinances for the time being in force*

Notwithstanding the integrated nature of a course spread over more than one academic year, the ordinances in force at the time a student joins a course shall hold good only for the examination held during or at the end of the academic year. Nothing in these Ordinances shall be deemed to debar the University from amending the ordinances subsequently and the amended ordinances, if any, shall apply to all the students whether old or new.

- 1 B.C.A. is an integrated course comprising three parts spread over three years. Each part will consist of two semesters. The course of study of B.C.A. shall be divided in six semesters and university examination will be held at the end of every semester in the months of November/December (for semester I, III & V) and May/June (for semester II, IV & VI) or as fixed by the Academic Council.
- 2 A candidate must complete and pass the whole course of three years within a maximum of five years from the date of admission in B.C.A. first semester.
- 3 The outlines of tests and syllabi shall be such as prescribed by the Academic Council from time to time.
- 4 A candidate will be eligible to join 1st semester of B.C.A course, if he/she has passed +2 examination of Punjab School Education Board, or any other examination recognised as equivalent thereto without reappear.
- 5 Semester examination will be open to regular candidates who have been on the rolls of a college affiliated to this University and meet the attendance and other requirements as prescribed in the Ordinances No.7
- 6 Subject to fulfilment of requirement of House examinations, the attendance requirements and these ordinances there will be no condition of passing papers for promotion from odd semester to even semester in an Academic Session.

To qualify for admission to 2nd year of the Course, the candidate must have passed 50% of total papers of the two semesters of the 1st year. Similarly, to qualify for admission to 3rd year of the course, the candidate should have passed 50% of total papers of four semesters of the earlier two years.

A candidate placed under reappear in any paper, will be allowed two chances to clear the reappear, which should be availed within consecutive two years/chances i.e. to pass in a paper the candidate will have a total of three chances, one as regular student and two as reappear candidate.

The examination of reappear papers of odd semester will be held with regular examination of the odd semester and reappear examination of the even semester will be held with regular examination of even semester. But if a candidate is placed under reappear in the last semester of the course, he will be provided chance to pass the reappear with the examination of the next semester, provided his reappear of lower semester does not go beyond next semester.

7 **Attendance Requirements**

Every candidate will be required to attend a minimum of 75% lectures delivered to that class in each paper as well as 75% of the laboratory work, seminars etc. separately. Provided that a deficiency in attendances may be condoned for special reasons, as per the relevant ordinances on the subject.

8 To be eligible to appear in the semester examination a candidate must have obtained in the house examination at least 25% marks in each paper; 33% marks in the aggregate of all subjects of the semester. The Principal at his discretion may allow a special test to a candidate who could not appear in the House examination owing to unavoidable reasons or fails to secure the minimum marks as prescribed above.

9 **Late College Students:** A candidate who has completed the prescribed course of instructions for a semester but has not appeared in the examination or having appeared, has failed in the examination, may appear as a late college student within the prescribed period.

10 The pass and reappear students of B.C.A Part-I and II from Panjab University, Guru Nanak Dev University and Punjab Technical University shall be treated at par with the corresponding students of this University. But in case such a student is admitted in B.C.A semester III or V in this University, he/she will be required to clear deficient papers, if any.

11 Amount of examination fee to be paid by a candidate for each semester shall be as fixed by the University from time to time.

12 Applications for admission to the examination shall be made on the prescribed form attested by the competent authority as per University rules. The last date by which admission forms and fees must reach the Registrar shall be as follows:

Semester Examination	Without late fee	With Rs. 800/- Late fee	With Rs. 1200/- Late fee	With Rs. 5000/- Late fee	With Rs. 10,000/- Late fee
December/January	30 <sup>th</sup> September	15 <sup>th</sup> October	21 <sup>st</sup> October	31 <sup>st</sup> October	10 <sup>th</sup> November
April/May	28 <sup>th</sup> February	15 <sup>th</sup> March	21 <sup>st</sup> March	31 <sup>st</sup> March	15 <sup>th</sup> April

13 University medal will be awarded to a candidate who secured first position in the University on the basis of the marks of all the six semesters taken together. The general rules and conditions of the University for the award of medal/prizes etc. will be applicable in the award of University medal to the topper of this examination.

14 The medium of instructions and examination will be English except for the Punjabi papers.

15 In each Paper 20% of the total marks are assigned to the internal assessment and 80% marks to the University examination.

- 16 The minimum number of marks required to pass the examination in each Part shall be 35% in each subject, provided that in subject with practical the percentage shall be required separately in written and practical/lab work. The candidate shall also be entitled to grace marks as admissible under the ordinances relating to the **`GENERAL GRACE MARKS`**.
- 17 The successful candidates shall be classified on the basis of aggregate marks secured in all the six semesters of B. C. A. taken together as under:
- (a) 75% or more with Distinction.
  - (b) 60% or more in the First division.
  - (c) 50% or more but less than 60% in the Second division.
  - (d) below 50% in the Third division.

# SYLLABUS BACHELOR OF COMPUTER APPLICATIONS

## OUTLINE OF PAPERS AND TESTS for B.C.A. First Year – First Semester 2013-14, 2014-15 & 2015-16 Sessions

Code	Title of Paper	Hours per Week	University Examination	Internal Assessment	Max. Marks	Exam. Duration Hours
BCA-111	General English – I	4	80	20*	100	3
BCA-112	Punjabi (Compulsory) or Punjabi Compulsory (Mudla Gyan) **	4	40	10	50	3
BCA-113	Fundamentals of Information Technology	4	80	20	100	3
BCA-114	Programming Fundamentals using C	4	80	20	100	3
BCA-115	Basic Mathematics	4	80	20	100	3
BCA-116	Software Lab – I (based on paper BCA-114: Programming Fundamentals using C)	8	60	40	100	3
<b>Total</b>			<b>420</b>	<b>130</b>	<b>550</b>	

**Note:**

1. The break up of marks for the practical will be as under:
 

i. Internal Assessment	40 Marks
ii. Viva Voce (External Evaluation)	20 Marks
iii. Lab Record Program Development and Execution(External Evaluation)	40 Marks
  
2. The break up of marks for the internal assessment for theory except BCA-111 will be as under:
 

i. One or two tests out of which minimum one best will be considered for assessment.	15 Marks
ii. Attendance, Class participation and behaviour	5 Marks

\*The break up of marks for the internal assessment for BCA-111: General English – I will be as under:

- |  |          |
|--|----------|
| i. Formal assessment through Interview/Self Introduction/Recitation etc.                               | 10 Marks |
| ii. Conversation Skills (particularly listening and speaking to be evaluated through oral examination) | 5 Marks  |
| iii. Attendance, Class participation and behaviour   | 5 Marks  |

**\*\* Only those students who have not studied Punjabi up to matriculation can opt for Punjab Compulsory (Mudla Gyan). The code for the paper is same.**

**OUTLINE OF PAPERS AND TESTS**  
**for**  
**B.C.A. First Year – Second Semester**  
**2013-14, 2014-15 & 2015-16 Sessions**

Code	Title of Paper	Hours per Week	University Examination	Internal Assessment	Max. Marks	Exam. Duration Hours
BCA-121	General English – II	4	80	20*	100	3
BCA-122	Punjabi (Compulsory) or Punjabi Compulsory (Mudla Gyan) **	4	40	10	50	3
BCA-123	Digital Electronics	4	80	20	100	3
BCA-124	Data Structures	4	80	20	100	3
BCA-125	Mathematical Foundation of Computer Science	4	80	20	100	3
BCA-126	Software Lab – II (based on BCA- 124: Data Structures)	8	60	40	100	3
<b>Total</b>			<b>420</b>	<b>130</b>	<b>550</b>	

**Note:**

1. The break up of marks for the practical will be as under:
    - i. Internal Assessment 40 Marks
    - ii. Viva Voce (External Evaluation) 20 Marks
    - iii. Lab Record Program Development and Execution(External Evaluation) 40 Marks
  
  2. The break up of marks for the internal assessment for theory papers except BCA-121 will be as under:
    - i. One or two tests out of which minimum one best will be considered for assessment. 15 Marks
    - ii. Attendance, Class participation and behaviour 5 Marks
- \*The break up of marks for the internal assessment for BCA-121: General English – II will be as under:
- i. Formal assessment through Interview/Self Introduction/Recitation etc. 10 Marks
  - ii. Conversation Skills (particularly listening and speaking to be evaluated through oral examination) 5 Marks
  - iii. Attendance, Class participation and behaviour 5 Marks

## BCA-111: General English – I

**Max Marks: 80**

**Min Pass Marks: 35%**

**Maximum Time: 3 Hrs.**

**Lectures to be delivered: 45-55 Hrs**

**General English** has been designed to develop the student's general competence in English. The overall aims of the course are to enable the learner to use English effectively for study purpose across the curriculum and develop and integrate the use of the four language skills, i.e. listening, speaking, reading and writing.

### **Texts Prescribed for Grammar and Vocabulary:**

W. Standard Allen: Living English Structure (Orient Longman)

Wilford D. Best: The Student's Companion (Rupa)

### **SECTION A: Comprehension**

**15 Marks**

One unseen passages of 250-300 words in length with a variety of comprehension questions including 05 marks for word-attack skills such as word formation and inferring meaning, finding opposites etc. The passage can be a factual passage (e.g., instruction, description, report etc.) or a literary passage (e.g., extract from fiction, drama, poetry, essay or biography), or a discursive passage involving opinion, (argumentative, persuasive or interpretative text).

### **SECTION B: Vocabulary**

**15 Marks**

Change the Number (attempt any 5 out of 7)(½ marks each)	2 ½ marks
Change the Gender (attempt 5 any out of 7)( ½ marks each)	2 ½ marks
Words commonly mis-spelt (correct any 5 out of 7)( ½ marks each)	2 ½ marks
Antonyms(attempt any 5 out of 7) (½ marks each)	2 ½ marks
Synonyms (attempt any 5 out of 7) (½ marks each)	2 ½ marks
Fill up using correct determinant (attempt any 5 out of 7) (½ marks each)	2 ½ marks

### **SECTION B: Grammar**

**25 Marks**

<i>Filling up the correct form types of the tense in the sentence: present/ past /future tense with simple/continuous/perfect/ perfect continuous forms (Attempt any 5 out of 7)</i>	5 marks
<i>Reordering word groups in the sentence to make a meaning full sentence. (Attempt any 5 out of 7)</i>	5 marks
<i>Identify various types of clauses and phrases in the sentence: finite and non-finite subordinate clauses: noun clauses and phrases, adjective clauses and phrases, adverb clauses and phrases(Attempt any 5 out of 7)</i>	5 marks
<i>Conversion among various types of sentences: affirmative, interrogative sentences, negation, exclamations (Attempt any 5 out of 7)</i>	5 marks
<i>Write meaning of given word and using in the sentence (Attempt any 5 out of 7)</i>	5 marks



**SECTION D: Composition**

**25 Marks**

*Composition* on a given topic/title based on any current social, environment, health issues. Students will be asked to attempt any one out of 4-5 options with word limit 150-175.

10 Marks

*Formal Letter Writing* (invitation, accepting/rejecting an invitation, apology, welcome, thanking complements )

7 ½ Marks

*Translating* a paragraph from Punjabi/Hindi to English (50-75 words)

7 ½ Marks

## BCA-112 : ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ

ਸਮਾਂ : 3 ਘੰਟੇ

ਕੁੱਲ ਅੰਕ : 50 (ਬਿਊਰੀ 40)  
(ਇੰਟਰਨਲ 10)

ਕੁੱਲ ਅਧਿਆਪਨ ਪੀਰੀਅਡ: 75 (4 ਪੀਰੀਅਡ ਪ੍ਰਤੀ ਹਫ਼ਤਾ)

ਪਾਸ ਹੋਣ ਲਈ ਅੰਕ: 35 ਪ੍ਰਤੀਸ਼ਤ

### ਸਿਲੇਬਸ ਅਤੇ ਪਾਠ-ਪੁਸਤਕਾਂ

1. ਪੰਜਾਬੀ ਦੀ ਪਾਠ ਪੁਸਤਕ : ਸੰਪਾਦਕ ਬਲਦੇਵ ਸਿੰਘ ਚੀਮਾ, ਪ੍ਰਕਾਸ਼ਨ: ਪਬਲੀਕੇਸ਼ਨ ਬਿਊਰੋ, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ।
2. ਪੈਰ੍ਹਾ ਰਚਨਾ
3. ਵਿਆਕਰਨ  
(ੳ) ਵਿਆਕਰਨ ਦੇ ਬੁਨਿਆਦੀ ਤੱਤ  
(ਅ) ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ ਅਤੇ ਰੂਪਾਂਤਰਨ
4. ਕ੍ਰਮਾਂਕ 1 ਦੇ ਆਧਾਰ ਤੇ ਛੋਟੇ ਪ੍ਰਸ਼ਨ

### ਅੰਕ-ਵੰਡ ਅਤੇ ਪੇਪਰ ਸੈਟਰ ਲਈ ਹਦਾਇਤਾਂ

- ਕਿਸੇ ਕਵਿਤਾ ਦਾ ਸਾਰ ਜਾਂ ਉਸ ਦਾ ਵਿਸ਼ਾ ਵਸਤੂ (ਦੋ ਵਿਚੋਂ ਇੱਕ) 8 ਅੰਕ  
ਕਿਸੇ ਰਚਨਾ (ਕਹਾਣੀ, ਲੇਖ) ਦਾ ਵਿਸ਼ਾ ਵਸਤੂ ਜਾਂ ਸਾਰ (ਦੋ ਵਿਚੋਂ ਇੱਕ) 8 ਅੰਕ  
(ੳ) ਪੈਰ੍ਹਾ ਰਚਨਾ (ਤਿੰਨ ਵਿਸ਼ੇ ਦੇ ਕੇ ਇੱਕ ਕਰਨ ਲਈ ਆਖਿਆ ਜਾਵੇਗਾ) 8 ਅੰਕ  
ਨੰਬਰ 3 ਉੱਤੇ ਦਿੱਤੇ ਵਿਆਕਰਨ ਦੇ ਸਿਲੇਬਸ ਦੇ ਆਧਾਰ ਉੱਤੇ ਵਰਣਾਤਮਿਕ ਚਾਰ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ, ਦੋ ਦਾ ਉੱਤਰ ਦੇਣ ਲਈ ਕਿਹਾ ਜਾਵੇਗਾ। 8 ਅੰਕ  
(ੳ) ਕ੍ਰਮਾਂਕ 1 ਦੀ ਪਾਠ-ਪੁਸਤਕ ਵਿਚੋਂ ਚਾਰ ਵਾਕਾਂ ਦਾ ਵਿਹਾਰਿਕ ਵਿਆਕਰਨਕ ਵਿਸ਼ਲੇਸ਼ਣ। ਇਹ ਪ੍ਰਸ਼ਨ ਨੰ: 3 ਵਿਚ ਨਿਰਧਾਰਿਤ ਵਿਆਕਰਨ ਵਾਲੇ ਪੱਖਾਂ ਉੱਤੇ ਹੀ ਆਧਾਰਿਤ ਹੋਵੇਗਾ।  
4×1=4 ਅੰਕ  
(ਅ) ਕ੍ਰਮਾਂਕ 1 ਦੇ ਆਧਾਰ ਤੇ 4 ਛੋਟੇ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣ। 4×1=4 ਅੰਕ

ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ (ਮੁੱਢਲਾ ਗਿਆਨ)  
ਸਮੈਸਟਰ ਪ੍ਰਣਾਲੀ (ਸਮੈਸਟਰ ਪਹਿਲਾ)  
2013-14, 2014-15 ਸੈਸ਼ਨ ਲਈ

ਸਮਾਂ : 3 ਘੰਟੇ

ਕੁੱਲ ਅੰਕ : 50 (ਬਿਊਰੀ 40)

ਅੰਦਰੂਨੀ ਮੂਲਾਂਕਣ : 10

ਬਾਹਰੀ ਮੂਲਾਂਕਣ : 40

ਕੋਰਸ ਸਮਾਂ: ਛੇ ਪੀਰੀਅਡ ਪ੍ਰਤੀ ਹਫ਼ਤਾ

ਪਾਸ ਹੋਣ ਲਈ ਅੰਕ: 35 ਪ੍ਰਤੀਸ਼ਤ

1. ਗੁਰਮੁਖੀ ਵਰਨਮਾਲਾ ਤੇ ਲੇਖਣ-ਪ੍ਰਬੰਧ  
(ੳ) ਅੱਖਰ ਸਿੱਖਿਆ : ਤਰਤੀਬਵਾਰ ਤੇ ਭੁਲਾਂਵੇ ਅੱਖਰ।  
(ਅ) ਅੱਖਰ ਬਣਤਰ : ਅੱਖਰ ਰੂਪ ਤੇ ਲੇਖਣ ਦੇ ਨਿਯਮ।
2. ਗੁਰਮੁਖੀ ਅੱਖਰ ਤੇ ਪੰਜਾਬੀ ਧੁਨੀਆਂ ਦਾ ਪ੍ਰਬੰਧ  
(ੳ) ਸਵਰ ਤੇ ਵਿਅੰਜਨ : ਵਰਗੀਕਰਨ ਦੇ ਸਿਧਾਂਤ ਤੇ ਉਚਾਰਨ।  
(ਅ) ਸਵਰ ਸੂਚਕ ਅੱਖਰਾਂ ਤੇ ਧੁਨੀਆਂ ਦੀ ਪਛਾਣ ਤੇ ਵਰਤੋਂ।  
(ੲ) ਵਿਅੰਜਨ ਸੂਚਕ ਅੱਖਰਾਂ ਤੇ ਧੁਨੀਆਂ ਦੀ ਪਛਾਣ ਤੇ ਵਰਤੋਂ।  
(ਸ) ਲਗਾਂ-ਮਾਤਰਾਂ ਦੀ ਪਛਾਣ ਤੇ ਵਰਤੋਂ।  
(ਹ) ਲਗਾਖਰਾਂ ਦੀ ਪਛਾਣ।
3. ਲਿਪੀ ਦੇ ਅੱਖਰਾਂ ਦੀ ਵਰਤੋਂ ਦੇ ਨਿਯਮ  
(ੳ) ਪੂਰੇ ਤੇ ਅੱਧੇ ਅੱਖਰਾਂ ਦੀ ਪਛਾਣ ਤੇ ਵਰਤੋਂ।  
(ਅ) ਸਵਰ ਸੂਚਕ ਅੱਖਰਾਂ ਦੀ ਪਛਾਣ ਤੇ ਵਰਤੋਂ।  
(ੲ) ਸਵਰ ਵਾਹਕਾਂ ਦੀ ਪਛਾਣ ਤੇ ਵਰਤੋਂ।  
(ਸ) ਮਾਤਰਾ ਤੇ ਸਵਰ ਵਾਹਕਾਂ ਦੀ ਸਾਂਝੀ ਵਰਤੋਂ।  
(ਹ) ਮਾਤਰਾ ਦੀ ਵਿਅੰਜਨ ਸੂਚਕਾਂ ਨਾਲ ਵਰਤੋਂ।
4. ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ ਨਾਲ ਜਾਣ ਪਛਾਣ  
(ੳ) ਗਿਣਤੀ  
(ਅ) ਹਫ਼ਤੇ ਦੇ ਦਿਨ  
(ੲ) ਰੰਗਾਂ ਦੇ ਨਾਂ  
(ਸ) ਪਸ਼ੂ ਪੰਛੀਆਂ ਦੇ ਨਾਂ  
(ਹ) ਪੰਜਾਬੀ ਰਿਸ਼ਤਾ-ਨਾਤਾ ਪ੍ਰਬੰਧ ਦੀ ਸ਼ਬਦਾਵਲੀ  
(ਕ) ਘਰੇਲੂ ਵਸਤਾਂ ਦੀ ਸ਼ਬਦਾਵਲੀ

## ਪੇਪਰ ਸੈਟਰ ਲਈ ਹਦਾਇਤਾਂ

ਹਰ ਭਾਗ ਨੂੰ ਬਰਾਬਰ ਅੰਕਾਂ ਦੀ ਪ੍ਰਤੀਨਿਧਤਾ ਦਿੱਤੀ ਜਾਵੇ।

(ਵਿਦਿਆਰਥੀ ਪਹਿਲੀ ਵਾਰ ਗੁਰਮੁਖੀ ਲਿਪੀ ਸਿੱਖ ਰਹੇ ਹਨ। ਹੋ ਸਕਦਾ ਹੈ ਵਿਦਿਆਰਥੀ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਤੋਂ ਅਨਜਾਣ ਹੋਣ, ਸੋ ਪ੍ਰਸ਼ਨਾਂ ਦਾ ਪੱਧਰ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਸੀਮਾ ਨੂੰ ਧਿਆਨ ਵਿੱਚ ਰੱਖਿਆ ਜਾਵੇ।)

### ਸਹਾਇਕ ਪੁਸਤਕਾਂ

1. ਸਤਿਨਾਮ ਸਿੰਘ ਸੰਧੂ, ਆਓ ਪੰਜਾਬੀ ਸਿਖੀਏ, ਪਬਲੀਕੇਸ਼ਨ ਬਿਊਰੋ, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ, 2009। (ਹਿੰਦੀ ਤੋਂ ਪੰਜਾਬੀ ਸਿਖਣ ਲਈ)
2. ਸਤਿਨਾਮ ਸਿੰਘ ਸੰਧੂ, ਗੁਰਮੁਖੀ ਸਿੱਖੇ, ਪਬਲੀਕੇਸ਼ਨ ਬਿਊਰੋ, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ, 2011। (ਅੰਗਰੇਜ਼ੀ ਤੋਂ ਪੰਜਾਬੀ ਸਿਖਣ ਲਈ)
3. ਸੀਤਾ ਰਾਮ ਬਾਹਰੀ, ਪੰਜਾਬੀ ਸਿਖੀਏ, ਪਬਲੀਕੇਸ਼ਨ ਬਿਊਰੋ, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ, 2002 (ਹਿੰਦੀ)
4. ਰਾਜਵਿੰਦਰ ਸਿੰਘ, ਪੰਜਾਬੀ ਗਿਆਨ ਸੀ.ਡੀ. (ਕੰਪਿਊਟਰ ਐਪਲੀਕੇਸ਼ਨ ਟੂ-ਲਰਨ ਐਂਡ ਟੀਚ ਪੰਜਾਬੀ), ਪਬਲੀਕੇਸ਼ਨ ਬਿਊਰੋ, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ, 2011।
5. Hardev Bahri, Teach Yourself Punjabi, Publication Bureau, Punjabi University, Patiala, 2011.
6. Henry A. Gleason and Harjeet Singh Gill, A Start in Punjabi, Publication Bureau, Punjabi University, Patiala, 1997.
7. Ujjal Singh Bahri and Paramjit Singh Walia, Introductory Punjabi, Publication Bureau, Punjabi University, Patiala, 2003.

## BCA-113: Fundamentals of Information Technology

**Max Marks: 80**

**Min Pass Marks: 35%**

**Maximum Time: 3 Hrs.**

**Lectures to be delivered: 45-55 Hrs**

### INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections: A, B & C. Sections A & B will have four questions each from the respective sections of the syllabus carrying 15 marks for each question. Section C will have 10 short-answer type questions carrying a total of 20 marks, which will cover the entire syllabus uniformly..

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from the sections A & B of the question paper and the entire section C.

### SECTION-A

**Computer Fundamentals:** Block diagram of a computer, characteristics of computers and generations of computers.

**Input Devices:** Keyboard, Mouse, Joy tick, Track Ball, Touch Screen, Light Pen, Digitizer, Scanners, Speech Recognition Devices, Optical Recognition devices – OMR, OBR, OCR

**Output Devices:** Monitors, Impact Printers - Dot matrix, Character and Line printer, Non Impact Printers – DeskJet and Laser printers, Plotter.

**Memories:** Main Memories - RAM, ROM and Secondary Storage Devices - Hard Disk, Compact Disk, DVD.

**Computer Languages:** Machine language, assembly language, high level language, 4GL, Introduction to Compiler, Interpreter, Assembler, System Software, Application Software.

### SECTION-B

**Number System:** Non-positional and positional number systems, Base conversion, Concept of Bit and Byte, binary, decimal, hexadecimal, and octal systems, conversion from one system to the other.

**Binary Arithmetic:** Addition, subtraction and multiplication., 1's complement, 2's complement, subtraction using 1's complement and 2's complement.

**Operating System:** Batch, Multiprogramming, time-sharing, on-line and real time operating system, Multi-processor, Multi-tasking.

**Computer Network:** Network types, network topologies.

**Introduction to the Concept to Internet:** Evolution of Internet, Internet Applications, WWW, E-mail, FTP, TELNET, Web Browsers.

**Applications of Information Technology and Trends:** IT in Business and Industry, IT in Education & training, IT in Science and Technology, IT and Entertainment, Current Trends in IT Application - AI, Virtual Reports, voice recognition, Robots, Multimedia Technology.

### References:

- 1 P.K. Sinha and P. Sinha, Foundations of Computing, First Edition, 2002, BPB.
- 2 Chetan Srivastva, Fundamentals of Information Technology, Kalyani Publishers.
- 3 Turban Mclean and Wetbrete, Information Technology and Management, Second Edition, 2001, John Wiley & Sons.
- 4 Satish Jain, Information Technology, BPB, 1999.

## BCA-114: Programming Fundamentals using C

**Max Marks: 80**

**Min Pass Marks: 35%**

**Maximum Time: 3 Hrs.**

**Lectures to be delivered: 45-55 Hrs**

### INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections: A, B & C. Sections A & B will have four questions each from the respective sections of the syllabus carrying 15 marks for each question. Section C will have 10 short-answer type questions carrying a total of 20 marks, which will cover the entire syllabus uniformly..

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from the sections A & B of the question paper and the entire section C.

#### Section - A

**Programming Process:** Problem definition, Algorithm development, Flowchart, Coding, Compilation and debugging.

**Basic structure of C program:** History of C, Structure of a C program, Character set, Identifiers and keywords, constants, variables, data types.

**Operators and expressions:** Arithmetic, Unary, Logical, Relational operators, assignment operators, Conditional operators, Hierarchy of operations type conversion.

**Control statements:** branching statements ( if, if else, switch), loop statements (for, while and do-while), jump statements (break, continue, goto), nested control structures.

**Functions:** Library functions and user defined functions, prototype, definition and call, formal and actual arguments, local and global variables, methods of parameter passing to functions, recursion.

**I/O functions:** formatted & unformatted console I/O functions

#### Section - B

**Storage Classes:** automatic, external, static and register variables.

**Arrays:** – One dimensional and two dimensional arrays

Declaration, initialization, reading values into an array, displaying array contents

**Strings:** input/output of strings, string handling functions (strlen, strcpy, strcmp, strcat & strrev), table of strings.

**Structures and unions:** using structures and unions, comparison of structure with arrays and union.

**Pointers:** pointer data type, pointer declaration, initialization, accessing values using pointers, pointers and arrays.

**Introduction to Files in C:** opening and closing files. Basic I/O operation on files.

#### Text Book:

1 E. Balagurusamy, “Programming in C”, Tata McGraw Hill.

#### References:

1 Kernighan and Ritchie, “The C Programming Language”, PHI.

2 Byron Gotfried, “Programming in C”.

3 Kamathane, “Programming in C”, Oxford University Press.

## BCA-115: Basic Mathematics

**Max Marks: 80**

**Min Pass Marks: 35%**

**Maximum Time: 3 Hrs.**

**Lectures to be delivered: 45-55 Hrs**

### INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections: A, B & C. Sections A & B will have four questions each from the respective sections of the syllabus carrying 15 marks for each question. Section C will have 10 short-answer type questions carrying a total of 20 marks, which will cover the entire syllabus uniformly..

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from the sections A & B of the question paper and the entire section C.

#### Section - A

**Complex Numbers:** Complex Numbers in the form of  $a+ib$ , Real and Imaginary parts of a complex number, Complex conjugate, algebra of complex numbers, square roots of a complex number, cube roots of unity.

**Quadratic Equations:** Solutions of Quadratic equations (with real and complex coefficients), Relations between roots and coefficients, Nature of roots, Equations reducible to quadratic equations.

**Sequence and Series:** Sequence and series, Arithmetic Progression (A.P.), Arithmetic Mean (A.M.),  $n$ th term, sum to  $n$  terms of an AP, Geometric Progression (G.P.), general term of GP, sum to  $n$  terms of a GP, Infinite GP and its sum, Geometric mean (G.M.), Sum to  $n$  terms of special series  $\sum n$ ,  $\sum n^2$ ,  $\sum n^3$

#### Section - B

**Inequalities:** Solution of Linear and Quadratic Inequalities.

**Counting:** The basics of counting, Permutation and combinations.

**Binomial Theorem:** Expansion, General term, middle term, Independent term.

**Cartesian System of Rectangular Coordinates:** Cartesian coordinate system, distance formula, section formula, centroid and incentre, area of triangle, condition for collinearities of three points in a plane.

**Straight Line:** Slope of a line, parallel and perpendicular lines, Equation of line in different forms, distance of a point from a line.

**Circle:** Standard form of equation of circle, General form, diameter form, three point form, Intersection of a line and a circle.

#### Text Book:

1. NCERT Textbooks of Mathematics for +1 and +2.

## **BCA-116: Software Lab – I**

**(Based on paper BCA-114: Programming Fundamentals using C)**

**Max Marks: 100**

**Maximum Time: 3 Hrs.**

**Min Pass Marks: 35%**

**Practical Sessions to be conducted: 12 periods per week)**

This laboratory course will comprise as exercises to supplement what is learnt under paper BCA-114: Programming Fundamental using C. Students are required to develop the following programs with internal documentation:

### **1. Operators and data types in C**

- a) Write a program to print the size of all the data types supported by C and its range.
- b) Write a program to convert temperature from Fahrenheit to Celsius.
- c) Write a program to find simple interest and compound interest.

### **2. Control statements**

- a) Write a program to check whether the given number is a even number or not.
- b) Write a program to accept three numbers and find the largest among them.
- c) Write a program to count the different vowels in a line of text using switch.
- d) Write a program to accept two numbers and perform various arithmetic operations (+, -, \*, /) based on the symbol entered.
- e) Write a program to find factorial of a number.
- f) Write a program to check whether a number is prime or not.
- g) Write a program to print all prime numbers between any 2 given limits.
- h) Write a program to check whether a number is palindrome or not.
- i) Write a program to print all the Armstrong numbers between any 2 given limits.

### **4. Arrays and strings**

- a) Write a program to find largest element in an array.
- b) Write a program to find sum and average of numbers stored in an array.
- c) Write a program to check whether a string is a Palindrome.
- d) Write a program to perform matrix addition.
- e) Write a program to perform matrix multiplication.

### **6 Functions and recursion**

- a) Write a program to find the roots of a quadratic equation using function.
- b) Write a recursive program to find the factorial of a number.
- c) Write a recursive program to find the nth Fibonacci number.

### **7. Structures and unions**

- a. Create an employee structure and display the same.
- b. Create a student database storing the roll no, name, class etc and sort by name.

### **8. Aim: To learn about pointers**

- a. Write a function to swap two numbers using pointers
- b. Write a program to access an array of integers using pointers



### **9. Aim: To learn about Files**

a. Create a file and store some records in it. Display the contents of the same. Count numbers of characters, words and lines in the file.

**The break up of marks for the practical will be as under**

<b>i.</b>	<b>Internal Assessment</b>	<b>40 Marks</b>
<b>ii.</b>	<b>Viva Voce (External Evaluation)</b>	<b>20 Marks</b>
<b>iii.</b>	<b>Lab Record, Program Development and Execution(External Evaluation)</b>	<b>40 Marks</b>

## BCA-121: General English – II

**Max Marks: 80**

**Min Pass Marks: 35%**

**Maximum Time: 3 Hrs.**

**Lectures to be delivered: 45-55 Hrs**

**General English** has been designed to develop the student's general competence in English. The overall aims of the course are to enable the learner to use English effectively for study purpose across the curriculum and develop and integrate the use of the four language skills, i.e. listening, speaking, reading and writing.

### **Texts Prescribed for Grammar and Vocabulary:**

W. Standard Allen: Living English Structure (Orient Longman)

Wilford D. Best: The Student's Companion (Rupa)

### **SECTION A: Comprehension**

**15 Marks**

One unseen passages of 300-350 words in length with a variety of comprehension questions including 05 marks for word-attack skills such as word formation and inferring meaning, finding opposites etc. The passage can be a factual passage (e.g., instruction, description, report etc.) or a literary passage (e.g., extract from fiction, drama, poetry, essay or biography), or a discursive passage involving opinion, (argumentative, persuasive or interpretative text).

### **SECTION B: Vocabulary**

**20 Marks**

- |   |           |
|---|-----------|
| Fill up using correct form of verb(Attempt any 5 out of 7)( ½ marks each)   | 2 ½ marks |
| Usage of the adverb, adjective etc. (Attempt any 5 out of 7)( ½ marks each)   | 2 ½ marks |
| Write Antonym of the given word and use both the given word and its antonym in the single sentence clarifying meaning and usage(Attempt any 5 out of 7) | 5 marks   |
| Give different meanings to Synonyms and use them in sentences (Attempt any 5 out of 7)  | 5 marks   |
| Give meaning and make sentences for idioms (Attempt any 5 out of 7)   | 5 marks   |

### **SECTION C: Grammar**

**20 Marks**

- |   |         |
|---|---------|
| <i>Conversion among various types of the tenses</i> in the sentence: present/past /future tense with simple/continuous/perfect forms (Attempt any 5 out of 7) | 5 marks |
| <i>Conversion between Direct/Indirect speech</i> (Attempt any 5 out of 7)   | 5 marks |
| <i>Conversion between active/passive voice</i> (Attempt any 5 out of 7)   | 5 marks |
| <i>Conversion among various types of sentences:</i> affirmative, interrogative sentences, negation, exclamations (Attempt any 5 out of 7)                     | 5 marks |

**SECTION D: Composition**

**25 Marks**

*Composition* on a given topic/title based on any current social, environment, health issues. Students will be asked to attempt any one out of 4-5 options with word limit 150-175.

10 Marks

*Formal Letter Writing* (Applying for a job, making a complaint, asking for information )

7 ½ Marks

*Translating* a paragraph from Punjabi/Hindi to English (50-75 words)

7 ½ Marks

**BCA : 122 ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ**  
**ਸਮੇਸਟਰ ਦੂਜਾ**

ਸਮਾਂ : 3 ਘੰਟੇ

ਕੁੱਲ ਅੰਕ : 50 (ਬਿਊਰੀ 40)  
(ਇੰਟਰਨਲ 10)

ਕੁੱਲ ਅਧਿਆਪਨ ਪੀਰੀਅਡ: 75 (4 ਪੀਰੀਅਡ ਪ੍ਰਤੀ ਹਫ਼ਤਾ)

ਪਾਸ ਹੋਣ ਲਈ ਅੰਕ: 35 ਪ੍ਰਤੀਸ਼ਤ

**ਸਿਲੇਬਸ ਅਤੇ ਪਾਠ-ਪੁਸਤਕਾਂ**

1. ਅੰਮ੍ਰਿਤਾ ਪ੍ਰੀਤਮ : ਪਿੰਜਰ
2. ਚਿੱਠੀ ਪੱਤਰ
3. ਵਿਆਕਰਨ

(ੳ) ਭਾਸ਼ਾ ਵੰਨਗੀਆਂ: ਭਾਸ਼ਾ ਦਾ ਟਕਸਾਲੀ ਰੂਪ, ਭਾਸ਼ਾ ਤੇ ਉਪ-ਭਾਸ਼ਾ ਦਾ ਅੰਤਰ ਅਤੇ ਅੰਤਰ ਸਬੰਧ, ਪੰਜਾਬੀ ਉਪ-ਭਾਸ਼ਾਵਾਂ ਦੇ ਪਛਾਣ ਚਿੰਨ੍ਹ

(ਅ) ਗੁਰਮੁੱਖੀ ਲਿੱਪੀ ਅਤੇ ਸ਼ਬਦ ਜੋੜ

4. ਕ੍ਰਮਾਂਕ 1 ਦੇ ਆਧਾਰ ਤੇ ਛੋਟੇ ਪ੍ਰਸ਼ਨ

**ਅੰਕ-ਵੰਡ ਅਤੇ ਪੇਪਰ ਸੈਟਰ ਲਈ ਹਦਾਇਤਾਂ**

1. ਨਾਵਲ ਦਾ ਸਾਰ ਜਾਂ ਉਸ ਦਾ ਵਿਸ਼ਾ ਵਸਤੂ, ਪਾਤਰ ਉਸਾਰੀ (ਦੋ ਵਿਚੋਂ ਇੱਕ) 16 ਅੰਕ
2. ਚਿੱਠੀ ਪੱਤਰ 8 ਅੰਕ
3. ਨੰਬਰ 3 ਉਤੇ ਦਿੱਤੇ ਵਿਆਕਰਨ ਦੇ ਸਿਲੇਬਸ ਦੇ ਆਧਾਰ ਉਤੇ ਵਰਣਾਤਮਿਕ ਚਾਰ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ, ਦੋ ਦਾ ਉੱਤਰ ਦੇਣ ਲਈ ਕਿਹਾ ਜਾਵੇਗਾ। 8 ਅੰਕ

4.

(ੳ) ਕ੍ਰਮਾਂਕ 1 ਦੀ ਪਾਠ-ਪੁਸਤਕ ਵਿਚੋਂ ਚਾਰ ਵਾਕਾਂ ਦਾ ਵਿਹਾਰਿਕ ਵਿਆਕਰਨਕ ਵਿਸ਼ਲੇਸ਼ਣ। ਇਹ ਪ੍ਰਸ਼ਨ ਨੰ: 4 ਵਿਚ ਨਿਰਧਾਰਿਤ ਵਿਆਕਰਨ ਵਾਲੇ ਪੱਖਾਂ ਉਤੇ ਹੀ ਆਧਾਰਿਤ ਹੋਵੇਗਾ।

4×1=4 ਅੰਕ

(ਅ) ਕ੍ਰਮਾਂਕ 1 ਦੇ ਆਧਾਰ ਤੇ 4 ਛੋਟੇ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣ।

4×1=4 ਅੰਕ

**ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ (ਮੁੱਢਲਾ ਗਿਆਨ)**  
**ਸਮੈਸਟਰ ਪ੍ਰਣਾਲੀ (ਸਮੈਸਟਰ ਦੂਜਾ)**  
**2013-14, 2014-15 ਸੈਸ਼ਨ ਲਈ**

ਸਮਾਂ : 3 ਘੰਟੇ

ਕੁੱਲ ਅੰਕ : 50 (ਬਿਊਰੀ 40)

ਅੰਦਰੂਨੀ ਮੂਲਾਂਕਣ : 10

ਬਾਹਰੀ ਮੂਲਾਂਕਣ : 40

ਕੋਰਸ ਸਮਾਂ: ਛੇ ਪੀਰੀਅਡ ਪ੍ਰਤੀ ਹਫ਼ਤਾ

ਪਾਸ ਹੋਣ ਲਈ ਅੰਕ: 35 ਪ੍ਰਤੀਸ਼ਤ

1. ਸ਼ਬਦ ਪ੍ਰਬੰਧ : ਸ਼ਬਦ ਜੋੜਾਂ ਦੀ ਵਰਤੋਂ
  - (ੳ) ਦੋ ਅੱਖਰੀ ਸ਼ਬਦਾਂ ਦੇ ਸ਼ਬਦ ਜੋੜ
  - (ਅ) ਤਿੰਨ ਅੱਖਰੀ ਸ਼ਬਦਾਂ ਦੇ ਸ਼ਬਦ ਜੋੜ
  - (ੲ) ਬਹੁ ਅੱਖਰੀ ਸ਼ਬਦਾਂ ਦੇ ਸ਼ਬਦ ਜੋੜ
2. ਸ਼ਬਦਾਂ ਦੀਆਂ ਸ਼ਰੇਣੀਆਂ ਤੇ ਵਿਆਕਰਨਕ ਵਰਗਾਂ ਦੀ ਪਛਾਣ
  - (ੳ) ਸ਼ਬਦਾਂ ਦੀਆਂ ਸ਼ਰੇਣੀਆਂ ਦਾ ਸਿਧਾਂਤ, ਪਛਾਣ ਤੇ ਵਰਤੋਂ  
(ਨਾਂਵ, ਪੜਨਾਂਵ, ਵਿਸ਼ੇਸ਼ਣ, ਕਿਰਿਆ, ਕਿਰਿਆ ਵਿਸ਼ੇਸ਼ਣ ਆਦਿ)
  - (ਅ) ਵਿਆਕਰਨਕ ਵਰਗਾਂ ਦੀ ਪਛਾਣ ਤੇ ਵਰਤੋਂ  
(ਲਿੰਗ, ਵਚਨ, ਪੁਰਖ, ਕਾਲ ਆਦਿ)
3. ਸ਼ਬਦ ਬਣਤਰਾਂ ਤੇ ਵਿਆਕਰਨਕ ਇਕਾਈਆਂ ਦਾ ਸਿਧਾਂਤ ਤੇ ਵਰਤੋਂ
  - (ੳ) ਪੰਜਾਬੀ ਸ਼ਬਦ ਬਣਤਰਾਂ ਦਾ ਸਿਧਾਂਤ, ਪਛਾਣ ਤੇ ਵਰਤੋਂ  
(ਅਗੇਤਰ, ਪਿਛੇਤਰ, ਸਮਾਸ, ਦੁਹਰਕਤੀ)
  - (ਅ) ਵਿਆਕਰਨਕ ਇਕਾਈਆਂ ਦਾ ਸਿਧਾਂਤ, ਪਛਾਣ ਤੇ ਵਰਤੋਂ  
(ਵਾਕੰਸ਼, ਉਪ-ਵਾਕ ਤੇ ਵਾਕ)
  - (ੲ) ਸ਼ਬਦਾਂ ਦਾ ਵਿਆਕਰਨਕ ਮੇਲ : ਸਿਧਾਂਤ ਤੇ ਵਿਹਾਰ
4. ਵਿਸਰਾਮ ਚਿੰਨ੍ਹਾਂ ਦੀ ਪਛਾਣ ਤੇ ਵਰਤੋਂ।

## ਪੇਪਰ ਸੈਟਰ ਲਈ ਹਦਾਇਤਾਂ

ਹਰ ਭਾਗ ਨੂੰ ਬਰਾਬਰ ਅੰਕਾਂ ਦੀ ਪ੍ਰਤੀਨਿਧਤਾ ਦਿੱਤੀ ਜਾਵੇ।  
(ਵਿਦਿਆਰਥੀ ਪਹਿਲੀ ਵਾਰ ਗੁਰਮੁਖੀ ਲਿਪੀ ਸਿੱਖ ਰਹੇ ਹਨ। ਹੋ ਸਕਦਾ ਹੈ ਵਿਦਿਆਰਥੀ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਤੋਂ ਅਨਜਾਣ ਹੋਣ, ਸੋ ਪ੍ਰਸ਼ਨਾਂ ਦਾ ਪੱਧਰ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਸੀਮਾ ਨੂੰ ਧਿਆਨ ਵਿੱਚ ਰੱਖਿਆ ਜਾਵੇ।)

### ਸਹਾਇਕ ਪੁਸਤਕਾਂ

1. ਸਤਿਨਾਮ ਸਿੰਘ ਸੰਧੂ, ਆਓ ਪੰਜਾਬੀ ਸਿਖੀਏ, ਪਬਲੀਕੇਸ਼ਨ ਬਿਊਰੋ, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ, 2009। (ਹਿੰਦੀ ਤੋਂ ਪੰਜਾਬੀ ਸਿਖਣ ਲਈ)
2. ਸਤਿਨਾਮ ਸਿੰਘ ਸੰਧੂ, ਗੁਰਮੁਖੀ ਸਿੱਖੇ, ਪਬਲੀਕੇਸ਼ਨ ਬਿਊਰੋ, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ, 2011। (ਅੰਗਰੇਜ਼ੀ ਤੋਂ ਪੰਜਾਬੀ ਸਿਖਣ ਲਈ)
3. ਸੀਤਾ ਰਾਮ ਬਾਹਰੀ, ਪੰਜਾਬੀ ਸਿਖੀਏ, ਪਬਲੀਕੇਸ਼ਨ ਬਿਊਰੋ, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ, 2002 (ਹਿੰਦੀ)
4. ਰਾਜਵਿੰਦਰ ਸਿੰਘ, ਪੰਜਾਬੀ ਗਿਆਨ ਸੀ.ਡੀ. (ਕੰਪਿਊਟਰ ਐਪਲੀਕੇਸ਼ਨ ਟੂ-ਲਰਨ ਐਂਡ ਟੀਚ ਪੰਜਾਬੀ), ਪਬਲੀਕੇਸ਼ਨ ਬਿਊਰੋ, ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ, 2011।
5. Hardev Bahri, Teach Yourself Punjabi, Publication Bureau, Punjabi University, Patiala, 2011.
6. Henry A. Gleason and Harjeet Singh Gill, A Start in Punjabi, Publication Bureau, Punjabi University, Patiala, 1997.
7. Ujjal Singh Bahri and Paramjit Singh Walia, Introductory Punjabi, Publication Bureau, Punjabi University, Patiala, 2003.

## **BCA-123: Digital Electronics**

**Max Marks: 80**

**Min Pass Marks: 35%**

**Maximum Time: 3 Hrs.**

**Lectures to be delivered: 45-55 Hrs**

### **INSTRUCTIONS FOR THE PAPER SETTER**

The question paper will consist of three sections: A, B & C. Sections A & B will have four questions each from the respective sections of the syllabus carrying 15 marks for each question. Section C will have 10 short-answer type questions carrying a total of 20 marks, which will cover the entire syllabus uniformly..

### **INSTRUCTIONS FOR THE CANDIDATES**

Candidates are required to attempt two questions each from the sections A & B of the question paper and the entire section C.

#### **Section-A**

Fundamental Concepts: Introduction to Analog and Digital Systems, Digital Signals, Basic Digital Circuits: AND, OR, NOT, NAND, NOR, XOR and XNOR gates. Boolean Algebra Theorems, Characteristics of Digital IC.

Number Systems: Positional and Non-positional number systems, Binary, Decimal, Octal and Hexadecimal, Base conversions, Binary arithmetic: Addition and Subtraction, 1's complement, 2's complement, subtraction using 1's complement and 2's complement.

Combinational Logic Design: SOP and POS Representation of Logic functions, K-Map representation and simplification up to 4 variable expressions, Don't care condition.

#### **Section - B**

Multiplexers: 4X1, 8X1 and 16X1. De-multiplexers: 1 to 4, 1 to 8 and 1 to 16. BCD to Decimal decoder, Decimal to BCD encoder. Parity generator and Parity checker.

Design of Half adder and Full adder

Flip-Flops: Introduction, Latch, Clocked S-R Flip Flop, Preset and Clear signals, D-Flip Flop, J-K Flip Flop, The race-around condition, Master Slave J-K Flip Flop, D-Flip-Flop, Excitation Tables of Flip Flops. Edge-Triggered Flip Flops.

A/D and D/A Converters: Introduction, Digital to Analog Converters: Weighted-Register D/A converter, R-2R Ladder D/A converter. Analog to Digital Converters: Quantization and encoding, Parallel-comparator A/D converter, Counting A/D converter.

#### **Text Book:**

1. Modern Digital Electronics by R. P. Jain, Fourth Edition, TMH

#### **References:**

1. Digital Principles and Applications by Albert Paul Malvino and Donald P. Leach, Fourth Edition, TMH
2. Digital Electronics: An Introduction to Theory and Practice by William H Gothmann, 2<sup>nd</sup> Edition, PHI

## BCA-124: Mathematical Foundation of Computer Science

**Max Marks: 80**

**Min Pass Marks: 35%**

**Maximum Time: 3 Hrs.**

**Lectures to be delivered: 45-55 Hrs**

### INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections: A, B & C. Sections A & B will have four questions each from the respective sections of the syllabus carrying 15 marks for each question. Section C will have 10 short-answer type questions carrying a total of 20 marks, which will cover the entire syllabus uniformly..

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from the sections A & B of the question paper and the entire section C.

#### Section - A

**Matrices:** Types of Matrices, Addition, Subtraction, Multiplication, Transpose, Conjugate and their properties, Symmetric, Skew-symmetric, Hermitian, Skew-Hermitian, Orthogonal and Unitary matrices, Minor, co-factors, Adjoint, Inverse of matrices, Solution of linear system of equations using matrices.

**Rank of a matrix,** consistency of linear system of equations, Characteristic equation, eigen values & eigen vectors, Diagonalization of matrices, Cayley Hamilton theorem.

**Determinants:** Expansion of determinants (upto order 4), solution of linear system of equations using Cramer rule, Properties of Determinants.

**Probability:** Elementary events, Sample space, Compound events, Type of events, Mutually Exclusive, Independent events, Addition Law of probability (for 2 and 3 events), Conditional probability, Multiplication Theorem of probability, Baye's theorem,

#### Section - B

**Linear Programming:** Foundations of the problem, Graphical method to solve LPP of two variables.

**General Linear Programming problem:** Simplex method, Artificial variable techniques, Two phase method, Dual of LPP

**Transportation problem:** Mathematical formulation of transportation problem, Initial Basic feasible solution ( NWCM, LCEM, VAM methods), Optimal solution using MODI method, Degeneracy in transportation problrms.

**Assignment Problem:** Mathematical formulation of Assignment problem, Solution by Hungarian method, Unbalanced Assignment problem, Maximisation Assignment problem.

#### Text Book:

1. "Higher Engineering Mathematics", B. S. Grewal, 35th Edition, Khanna Publishers.

#### References:

1. "Advanced Engineering Mathematics", E.Kreyszig, 8<sup>th</sup> Edition, Wiley.
2. "Advanced Engineering Mathematics", R. K. Jain & S.R.K. Iyenger, Wiley Eastern. Edition
3. "Engineering Mathematics Vol I & II" S. S. Sastry, PHI.



## BCA-125: Data Structures

**Max Marks: 80**

**Min Pass Marks: 35%**

**Maximum Time: 3 Hrs.**

**Lectures to be delivered: 45-55 Hrs**

### INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections: A, B & C. Sections A & B will have four questions each from the respective sections of the syllabus carrying 15 marks for each question. Section C will have 10 short-answer type questions carrying a total of 20 marks, which will cover the entire syllabus uniformly..

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt two questions each from the sections A & B of the question paper and the entire section C.

#### Section - A

**Basic concepts and notations:** Types of data structures, Data structure operations, Mathematical notations and functions, Algorithmic complexity, Big 'O' notation, Time and space trade off.

**Arrays:** Linear array, representation of array in memory, traversing linear array, insertion and deletion in an array, Two-dimensional array, row major and column major orders, sparse matrix.

**Stacks:** Representation of stacks in memory (linked and sequential), operations on stacks, Applications of stacks: string reversal, parentheses matching.

**Queues:** Representation of queues in memory (linked and sequential), operations on queues, insertion in rear, deletion from front.

#### Section - B

**Linked list:** Representation of linked list using static and dynamic data structures, insertion and deletion of a node from linked list, searching in link list, searching in sorted link list.

**Trees:** Definition and basic concepts, linked representation and representation in contiguous storage, binary tree, binary tree traversal, Binary search tree, searching, insertion and deletion in binary search tree.

**Searching and sorting algorithms:** Linear and binary search, bubble sort, insertion sort, selection sort, quick sort, merge sort.

#### Text Book

- 1 Seymour Lipschutz, "Theory and Practice of Data Structures", McGraw Hill.

#### References

- 1 Tenenbaum, Y. Lanhgsam and A. J. Augenstein, "Data Structures using C and C++", Prentice Hall of India.
- 2 Robert Sedgewick, "Algorithms in C", Pearson Education.

**BCA-126: Software Lab – II**  
**(Based on paper BCA-125: Data Structures)**

**Max Marks: 100 (**

**Maximum Time: 3 Hrs.**

**Min Pass Marks: 35%**

**Practical Sessions to be conducted: 12 Periods per week**

This laboratory course will comprise as exercises to supplement what is learnt under paper BCA-124: Data Structures. Students are required to develop *following* programs in C language with internal documentation

- 1 Program to insert an element from an array.
- 2 Program to delete an element from an array.
- 3 Program to store an array using sparse representation.
- 4 Program to apply various operations on stack.
- 5 Program for parenthesis matching using stack
- 6 Program for String reversal using stack.
- 7 Program to insert and delete nodes in a queue.
- 8 Program to insert and delete nodes in a linked list.
- 9 Program to search a node in a linked list.
- 10 Program to insert or delete node in a binary tree.
- 11 Program to traverse binary tree
- 12 Program for implementing linear search.
- 13 Program for implementing binary search.
- 14 Program for implementing Bubble sort.
- 15 Program for implementing Selection sort.
- 16 Program for implementing Bubble sort.
- 17 Program for implementing Insertion sort.
- 18 Program for implementing Quick sort.
- 19 Program for implementing Merge sort.

**The break up of marks for the practical will be as under**

- |  |                 |
|--|-----------------|
| <b>i. Internal Assessment</b>  | <b>40 Marks</b> |
| <b>ii. Viva Voce (External Evaluation)</b>                                     | <b>20 Marks</b> |
| <b>iii. Lab Record, Program Development and Execution(External Evaluation)</b> | <b>40 Marks</b> |