AGA KHAN UNIVERSITY EXAMINATION BOARD

**Secondary School Certificate
Examination Syllabus**

COMPUTER SCIENCE
CLASSES IX-X

(based on National Curriculum 2000)

Secondary School Certificate
Examination Syllabus

COMPUTER SCIENCE
CLASSES IX-X

**This subject is examined in both
May and September Examination sessions**

For queries and feedback

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PREFACE

In pursuance of National Education Policy (1998-2010), the Curriculum Wing of the Federal Ministry of Education has begun a process of curriculum reform to improve the quality of education through curriculum revision and textbook development (Preface, National Curriculum documents 2000 and 2002).

AKU-EB was founded in August 2003 with the same aim of improving the quality of education nationwide. As befits an examination board it seeks to reinforce the National Curriculum revision through the development of appropriate examinations for the Secondary School Certificate (SSC) and Higher Secondary School Certificate (HSSC) based on the latest National Curriculum and subject syllabus guidance.

AKU-EB has a mandate by Ordinance CXIV of 2002 to offer such examination services to English and Urdu medium candidates for SSC and HSSC from private schools anywhere in Pakistan or abroad, and from government schools with the relevant permissions. It has been accorded this mandate to introduce a choice of examination and associated educational approach for schools, thus fulfilling a key objective of the National Curriculum of Pakistan: "Autonomy will be given to the Examination Boards and Research and Development cells will be established in each Board to improve the system" (ibid. para. 6.5.3 (ii)).

AKU-EB is committed to creating continuity of educational experience and the best possible opportunities for its students. In consequence it offered HSSC for the first time in September, 2007 to coincide with the arrival of its first SSC students in college or higher secondary school. Needless to say this is not an exclusive offer. Private candidates and students joining AKU-EB affiliated schools and colleges for HSSC Part 1 are eligible to register as AKU-EB candidates even though they have not hitherto been associated with AKU-EB.

This examination syllabus exemplifies AKU-EB's commitment to national educational goals.

- It is in large part a reproduction, with some elaboration, of the Class IX and X National Curriculum of the subject.

- It makes the National Curriculum freely available to the general public.

- The syllabus recommends a range of suitable textbooks already in print for student purchase and additional texts for the school library.

- It identifies areas where teachers should work together to generate classroom activities and materials for their students as a step towards the introduction of multiple textbooks, another of the Ministry of Education's policy provisions for the improvement of secondary education (ibid. para. 6.3.4).

This examination syllabus brings together all those cognitive outcomes of the National Curriculum statement which can be reliably and validly assessed. While the focus is on the cognitive domain, particular emphasis is given to the application of knowledge and understanding, a fundamental activity in fostering "attitudes befitting useful and peaceful citizens and the skills for and commitment to lifelong learning which is the cornerstone of national economic development" (Preface to National Curriculum documents 2000 and 2002).

To achieve this end AKU-EB has brought together university academics, teacher trainers, writers of learning materials and above all, experienced teachers, in regular workshops and subject panel meetings.

AKU-EB provides copies of the examination syllabus to subject teachers in affiliated schools to help them in planning their teaching. It is the syllabus, not the prescribed text book which is the basis of AKU-EB examinations. In addition, the AKU-EB examination syllabus can be used to identify the training needs of subject teachers and to develop learning support materials for students. Involving classroom teachers in these activities is an important part of the AKU-EB strategy for improving the quality of learning in schools.

The Curriculum Wing of the Federal Ministry of Education has recently released new subject specifications and schemes of study to take effect in September, 2008. These documents are a major step forward towards a standards-related curriculum and have been welcomed by AKU-EB. Our current SSC syllabuses have been revised to ensure conformity with the new National Curriculum 2006.

We stand committed to all students entering the SSC course as well as those who have recently embarked upon the HSSC course in facilitating their learning outcome. Our examination syllabus document ensures all possible support.

Dr. Thomas Christie
Director,
Aga Khan University Examination Board
July 2009

1. **Aims/Objectives of the National Curriculum (2000)** [1]

The objective s of teaching Computer Science at the secondary level given in the National Curriculum document (2000) are as follows**:**

- " Understand the basic concepts, theories, and laws of computer science and their applications;
- Develop mathematical manipulation skills for designing different language programs in Computer Science;
- Understand and appreciate the role of Information Technology in socio- economic and cultural development of society;
- Develop skills for using and promoting Internet techniques;
- Provide sound but solid basis for further studies in the discipline of Computer Science and Information Technology." (p.2)

2. **Rationale of the AKU-EB Examination Syllabus**

2.1 **General Rationale**

2.1.1   In 2007, the Curriculum Wing of the Federal Ministry of Education (MoE) issued a revised part-wise Scheme of Studies. All subjects are to be taught and examined in both classes IX and X. It is therefore important for teachers, students, parents and other stakeholders to know:

   (a)   that the AKU-EB Scheme of Studies for its SSC examination (Annex A) derives directly from the 2007 Ministry of Education Scheme of Studies;
   (b)   which topics will be examined in Class IX and in Class X;
   (c)   at which cognitive level or levels (Knowledge, Understanding, Application and other higher order skills) the topics and sub-topics will be taught and examined;

2.1.2   This AKU-EB examination syllabus addresses these concerns. Without such guidance teachers and students have little option other than following a single textbook to prepare for an external examination. The result is a culture of rote memorization as the preferred method of examination preparation. The pedagogically desirable objectives of the National Curriculum which encourage "observation, creativity and other higher order thinking skills" are generally ignored. AKU-EB recommends that teachers and students use multiple teaching-learning resources for achieving the specific objectives of the National Curriculum reproduced in the AKU-EB examination syllabuses.

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[1] Government of Pakistan (2000), *National Curriculum; Computer Science Classes IX-X, Islamabad,* Ministry of Education (Curriculum Wing)

2.1.3   The AKU-EB examination syllabuses use a uniform layout for all subjects to make them easier for teachers to follow. Blank sheets are provided in each syllabus for writing notes on potential lesson plans. It is expected that this arrangement will also be found helpful by teachers in developing classroom assessments as well as by question setters preparing material for the AKU-EB external examinations. The AKU-EB aims to enhance the quality of education through improved classroom practices and improved examinations.

2.1.4   The Student Learning Outcomes (SLOs) in Section 3 start with command words such as list, describe, relate, explain, etc. The purpose of the command words is to direct the attention of teachers and students to specific tasks that candidates following the AKU-EB examination syllabuses are expected to undertake in the course of their subject studies. The examination questions will be framed using the same command words or the connotation of the command words to elicit evidence of these competencies in candidates' responses. The definitions of command words used in this syllabus are given in Section 7. It is hoped that teachers will find these definitions useful in planning their lessons and classroom assessments.

2.1.5   The AKU-EB has classified SLOs under the three cognitive levels Knowledge (K), Understanding (U) and Application of knowledge and skills (A) in order to derive multiple choice questions and constructed response questions on a rational basis from the subject syllabuses ensuring that the intentions of the National Curriculum should be met in full. The weighting of marks to the Multiple Choice and Constructed Response Papers is also derived from the SLOs, command words and cognitive levels. In effect the SLOs derived from the National Curriculum determine the structure of the AKU-EB subject examination set out in Section 4 and 5.

2.1.6   Some topics from the National Curriculum have been elaborated and enriched for better understanding of the subject and/or to better meet the needs of students in the twenty-first century. These additional topics have been italicized in Section 3 of this syllabus.

2.2   Specific Rationale of the AKU-EB Computer Science Examination Syllabus

2.2.1   The syllabus for computer science as prescribed by the Curriculum Wing in National Curriculum (2000) is maintained in its entirety except for a few changes which are made to keep the subject in line with global trends in the field of computer education by making the syllabus more practical and providing "hands on" experiences to students.

2.2.2   The National Curriculum is based on the assumption that students are exposed to computers initially in Classes IX and X. Many students will have encountered these elementary techniques much earlier. Therefore there is a need to focus on the latest developments in technology along with the existing devices which will lead to progression in learning computer skills.

2.2.3 Computer Studies is a practical subject, but the curriculum is more conceptual than practical. However, concepts must be seen to work in practical applications. Schools must ensure that equipment and facilities provided are adequate for the students to be able to work as required by the syllabus.

2.2.4 The student learning outcomes as outlined in the syllabus will facilitate both teachers and students to apply the knowledge and skills to new problems and situations.

2.2.5 The focus on hands-on learning experiences will allow students to test a variety of solutions, analyse results quickly and make predictions.

3. **Topics and Student Learning Outcomes of the Examination Syllabus**

Part I (Class IX)

Topics		Student Learning Outcomes		Cognitive Levels[2]		
				K	U	A
1. Introduction to Computers		**Candidates should be able to:**				
1.1	History and Development of Computer	1.1.1	*describe the various machines computer technologists designed or developed to make calculations simple;*		*	
		1.1.2	*identify and describe the components vacuum tubes, transistors, integrated circuits (ICs), microprocessors and VLSI's according to which computer are classified into various generations;*		*	
1.2	Types of Computers: Analogue, Hybrid and Digital	1.2.1	describe analogue, hybrid and digital computers;		*	
		1.2.2	*classify computers according to physical size, processing power and capabilities;*		*	
1.3	Classification of Digital Computers Micro, Mini, Mainframe and Super Computers	1.3.1	*describe various types of digital computers;*		*	
		1.3.2	*explain the use of types of digital computers according to their physical size, processing power and capabilities;*		*	
1.4	Introduction to Programming Languages (High and Low Level)	1.4.1	describe machine oriented, problem oriented languages and high level languages and differentiate between them;		*	
		1.4.2	*classify computer languages in various generations;*		*	

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[2] K = Knowledge, U = Understanding, A= Application (for explanation see Section 7: Definition of command words used in Student Learning Outcomes and in Examination Questions).

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					K	U	A
1.5	Concept of Compiler, Interpreter and Assembler	1.5.1	*define translators;*		*		
		1.5.2	differentiate among compiler, interpreter and assembler;			*	
		1.5.3	differentiate between compiled and interpreted languages.			*	
2.	**Computer Components**		**Candidates should be able to:**				
2.1	Central Processing Unit (CPU) Control Unit Arithmetic Logic Unit Buses: Data bus, Address bus and Control bus	2.1.1	identify various components of CPU;		*		*P
		2.1.2	*state the function of each unit and describe the relationship between the internal components of a personal computer;*			*	
2.2	Primary/Main Memory (RAM, ROM), Secondary Memory	2.2.1	*describe computer memory and its types i.e. primary and secondary;*			*	
		2.2.2	*differentiate between RAM and ROM;*			*	
		2.2.3	*describe the need for secondary memory;*			*	
2.3	Ports: Serial and Parallel	2.3.1	*identify serial, parallel ports and USB;*		*		
		2.3.2	*state the functions of serial and parallel ports;*		*		
		2.3.3	*explain the type of data they can handle.*			*	
3.	**Input Devices and Output Devices**		**Candidates should be able to:**				
3.1	Input Devices (keyboard, mouse, joystick, scanner, trackball, light pen, voice synthesizer, microphone, digital video camera, disk drive)	3.1.1	name different input devices;		*		*P
		3.1.2	*describe and demonstrate the use of a mouse and the function of right and left click;*				*
		3.1.3	*describe the five key groups of a keyboard;*			*	
		3.1.4	describe suitable input devices in relation to the requirements of the applications;			*	

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* P= practical activities to be carried out during the teaching learning process however question in the written paper can also be asked about the application of the concept.

NOTES

				K	U	A
		3.1.5	*describe the reasons for the use of alternate methods of input over a standard keyboard or mouse;*		*	
		3.1.6	*describe the at least two types of optical input devices and explain their uses;*		*	
3.2	Output Devices (monitors, printers and their kinds, plotters, CD writer, disk drive (hardcopy, softcopy))	3.2.1	name various output devices;	*		
		3.2.2	describe suitable output devices in relation to the requirements of the applications;		*	
		3.2.3	*describe the use of hardcopy output over softcopy output.*		*	
4. Storage Devices		**Candidates should be able to:**				
4.1	Main Memory RAM, ROM, SIMM, DIMM	4.1.1	describe characteristics of different types of main memory;		*	
4.2	Unit of Measurement bits, byte, KB, MB, GB, TB	4.2.1	recognize the value of units in KB MB GB TB and write these acronyms in full as words or numbers;	*		
		4.2.2	convert from one unit to another;			*
4.3	Secondary Memory Devices and Media floppy discs, Hard discs, CD and Magnetic tape	4.3.1	differentiate between media and devices;		*	
		4.3.2	justify the use of various devices and media in the concerned application;			*
		4.3.3	*describe the working of secondary memory devices;*		*	
		4.3.4	*describe the working of serial and sequential media.*		*	

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			K	U	A
5. Data Representation, Data Definition		Candidates should be able to:			
5.1	Types of Data; Numeric, Alphabetic, Alphanumeric	5.1.1 identify the main categories of data; 5.1.2 explain the use of type of data in concerned application;	*	*	
5.2	Number Systems; Decimal, Binary, Octal and Hexadecimal Representation of numbers using 1s and Os Fixed and Floating Point Number Representation	5.2.1 explain use of various number systems in computers; 5.2.2 explain the technique of representation of fixed and floating point numbers		* *	
5.3	Number System Conversion	5.3.1 convert from one number system to another;			*
5.4	Binary Arithmetic: Addition, Subtraction, Multiplication and Division	5.4.1 *use binary system for calculations;*			*
5.5	Coding Scheme Binary Coded, Decimal, ASCII	5.5.1 *name various international codes* 5.5.2 *state the importance of using standard International Codes.*	* *		
6. Introduction to Windows		Candidates should be able to:			
6.1	Loading Windows	6.1.1 *describe the operation of the Windows operating system;* 6.1.2 demonstrate the installation of windows;		*	*P

NOTES

				K	U	A
6.2	Windows Icons "My Computer" "Recycle bin" "Desktop"	6.2.1	describe a desktop and demonstrate its use;			*P
		6.2.2	*recognize the icons that appear on the desktop and describe their use and purpose;*		*	
		6.2.3	*explain and demonstrate the use of control panel folder to change the desktop background settings;*			*P
6.3	Start Button and other Options	6.3.1	*explain and demonstrate the use of 'start' button;*			*P
		6.3.2	*explain and demonstrate the function of 'start' button and the 'task bar';*			*P
		6.3.3	*explain and demonstrate the use of 'shutdown' button.*			*P
7. Application Software (Word Processor)		**Candidates should be able to:**				
7.1	Word Processor	7.1.1	explain the purpose and the use of word processing in daily life;		*	
7.2	Loading a Word Processor (MS word)	7.2.1	demonstrate the loading of Word processor using the start button;			*P
		7.2.2	*identify the status bar, menu bar and the tool bars and demonstrate their use;*			*P
7.3	Typing, Saving, Exiting	7.3.1	create a new document by typing some text and save it and exit out of WP;			*P
		7.3.2	edit an already existing Word processing document and resave it;			*P
		7.3.3	correct spelling using spell check and 'replace and find' a word;			*P
7.4	Text Formatting	7.4.1	change the font style and size of the text;			*P
		7.4.2	*change the line spacing;*			*P
		7.4.3	*arrange the text in columns;*			*P
		7.4.4	*apply the 'Change Case' option*			*P

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				K	U	A
7.5	Document Formatting Blocking, Moving Blocks of Text	7.5.1	use the status bar to copy or move a portion of a document to another place;			*P
		7.5.2	use insert option to include a picture from various sources, a symbol, page number and date and time;			*P
7.6	Indenting	7.6.1	use the format menu to indent a paragraph;			*P
7.7	Page Layout, Printing	7.7.1	select the page setup and layout according to the need;			*P
		7.7.2	demonstrate the use of print properties including page selection;			*P

8. Presentation Software (PowerPoint) — **Candidates should be able to:**

				K	U	A
8.1	PowerPoint Presentation	8.1.1	*describe the use of presentation software;*		*	
		8.1.2	*demonstrate the use of PowerPoint interface to create a simple presentation of at least 5 slides selecting a suitable template;*			*P
		8.1.3	*insert pictures, graphics, text, charts or table and also delete and edit contents on the slides;*			*P
		8.1.4	*run the slide show with animation effects.*			*P

9. Computer Software — **Candidates should be able to:**

				K	U	A
9.1	Types of Software (Text and Graphical)	9.1.1	*define the term software;*	*		
		9.1.2	*describe the purpose of software in a computer system;*		*	
		9.1.3	*describe the types of software in computer system namely system software and application software.*		*	
9.2	System Software	9.2.1	describe the types of system software namely utility programs and operating software;		*	
		9.2.2	describe the form of interface between a user and computer (text and graphical);		*	

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				K	U	A
		9.2.3	differentiate between DOS and Windows and their functions;		*	
		9.2.4	explain why DOS is no longer the dominant operating system for personal computers;		*	
9.3	Application Software	9.3.1	*explain application software and give its examples;*		*	
9.4	Generic Software	9.4.1	define generic software with examples of word processing, spread sheet and database software;	*		
		9.4.2	describe the use of spreadsheets in exploring "what if" scenarios and identify the best use of this application;		*	
		9.4.3	describe the use of databases and its application;		*	
		9.4.4	describe the advantages of integrated software packages, e.g. MS office, which bring different functions together to create new functions e.g. mail merge;		*	
9.5	DOS Commands Executable file.exe, .com, and .bat DIR with switches (cls, date, time, copy, ver, del, type, format, diskcopy, print, sys, chkdsk, edit, xcopy, deltree, prompt Path)	9.5.1	define the terms 'external' and 'internal' commands in DOS;	*		
		9.5.2	categorize the DOS commands as external and internal;		*	
		9.5.3	demonstrate the use of various commands in the laboratory;			*P
9.6	Create or Make Directory Remove/delete Command and other Commonly Used Commands	9.6.1	create a directory when required to copy a file or files;			*P
		9.6.2	remove a directory when a file or files are deleted.			*P

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Part II (Class X)

Topics		Student Learning Outcomes	Cognitive Levels		
			K	U	A
10. Impact of Computer on Society		**Candidates should be able to:**			
10.1 *Social and Economic Effects of Computers Changes in Environment Retraining*	10.1.1	explain the uses of computers and its effects on society;		*	
10.2 Internet	10.2.1	explain the basic requirements to access the internet to communicate globally;		*	
	10.2.2	describe the hardware and software which make it possible to access the internet;		*	
10.3 Virus and Anti-virus	10.3.1	describe a computer virus and its various types and explain its effects on the data;		*	
	10.3.2	describe how to combat the viruses with the help of firewalls, and other anti-virus programs;		*	
10.4 Hacking (Intrusion)	10.4.1	explain the meaning of unwanted access and suggest effective measures to avoid it;		*	
10.5 Plagiarism	10.5.1	discuss the importance of copyrights and licensing in computer software.		*	
10.6 Robotics	10.6.1	describe the use of automata e.g. robots used in the automobile industry;		*	
	10.6.2	describe the use of artificial intelligence in defence industry and weather forecast.		*	

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			K	U	A
11. Problem Solving	**Candidates should be able to:**				
11.1 The Problem	11.1.1	define the term 'problem';	*		
	11.1.2	describe the meaning of problem solving ;		*	
11.2 Analysis of the Problem,	11.2.1	demonstrate the importance of breaking down the given problem into various components to solve it;			*
11.3 Algorithm	11.3.1	*define the term algorithm and describe its types pseudo code and flow chart;*		*	
	11.3.2	design an algorithm to solve an arithmetic or simple daily life problem;			*
11.4 Flow Chart Symbols of Flow chart, Examples of Flow Charts, using Everyday Application	11.4.1	recognize the standard shapes of flow charts and apply them in solving simple problems of daily life;			*P
11.5 Computer Programming: Conversion of Flow chart, Algorithm into Instructions of Computer Language	11.5.1	describe that an algorithm and a flow chart are easily converted into programming language;		*	
	11.5.2	explain the meaning of computer instructions and a program;		*	
11.6 Running and Debugging the Program Types of Errors: Syntax and Logical	11.6.1	define the terms running and debugging;	*		
	11.6.2	identify two types of errors that occur during programming and give examples of each;	*		
11.7 Implementation and Documentation	11.7.1	*explain the terms implementation and documentation.*		*	

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					K	U	A
12. Data Types				**Candidates should be able to:**			
	12.1	Character Set Reserve Words, Commands and Statements	12.1.1 12.1.2 12.1.3	recognize the different types of data; recognize different types of instructions used in BASIC; identify key words of BASIC as statements, commands and functions;	* * *		
	12.2	Numeric and String Constants and Variables	12.2.1 12.2.2 12.2.3	define the terms constants and variables; differentiate between numeric and string constants and variables; assign appropriate data items to a given type of variable;	*	*	*
	12.3	Operators: Arithmetic, Relational and Logical	12.3.1 12.3.2	convert arithmetic expressions into BASIC expressions; use the operators of BASIC language to solve an arithmetic problem;		*	*
	12.4	Hierarchy of Operators, Arithmetic Expressions, Relational and Logical	12.4.1 12.4.2 12.4.3	demonstrate the hierarchy of operators in BASIC language; compare two or more values using relational operators; demonstrate the use of logical operators to compare a value or a variable with more than one value or variables;		*	* *
	Statements 12.5	Assignment LET Statement	12.5.1 12.5.2	show the purpose and the syntax of LET statements; assign data to a variable for various calculations;		*	*
	12.6	INPUT/OUTPUT Statements INPUT, READ-DATA	12.6.1	demonstrate the purpose and the syntax of INPUT statement and Read-Data;			*P
	12.7	PRINT	12.7.1	demonstrate the purpose and the syntax of PRINT statement;			*P

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				K	U	A
13. Control Statements		**Candidates should be able to:**				
13.1 Transfer of Control GOTO, ON …GOTO IF …THEN…ELSE, ON ERROR … GOTO		13.1.1	*explain and differentiate the use of between conditional and unconditional and multiple branching;*		*	
		13.1.2	use a GOTO statement for unconditional branching to remote statement;			*P
		13.1.3	demonstrate the use of GOTO statements with IF-THEN …ELSE in a program;			*P
		13.1.4	demonstrate the use of ON … GOTO in a program;			*P
13.2 LOOPs FOR …NEXT Statement, WHILE …WEND Statement, Loops and Nested Loop		13.2.1	define the term Loop;	*		
		13.2.2	state the syntax and the purpose of statement, FOR …NEXT and WHILE … WEND statements;	*		
		13.2.3	use different types of looping statements in a repetitive program;.			*P
		13.2.4	*state the purpose and demonstrate the use of nested loops in a program.*			*P
14. Arrays		**Candidates should be able to:**				
14.1 One and Two Dimensional Arrays		14.1.1	*define the term array;*	*		
		14.1.2	*use one and two dimensional arrays;*			*P
		14.1.3	demonstrate the use of one and two dimensional arrays in a program;			*P
14.2 Reading, Writing and Manipulation of Arrays		14.2.1	demonstrate reading, writing and manipulation of data using an array.			*P

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			K	U	A
15. Sub-Program and File Handling	**Candidates should be able to:**				
15.1 Functions: Built in Functions and User Defined Functions	15.1.1	explain the purpose of built in functions and demonstrate their use in a program;			*
	15.1.2	*describe and demonstrate the use of built in functions for formatted output;*			*P
	15.1.3	*create a user defined function for simple mathematics formula;*			*P
15.2 Subroutines	15.2.1	describe a subroutine;		*	
	15.2.2	demonstrate the use of subroutine programs in a main program;			*P
15.3 Reading and Writing into Files	15.3.1	show short programs to make a file of names and associate a unique identifier with each name;		*	
15.4 Graphics Sketching and Drawing of Graphics using Utilities such as DRAW and COLOR Generating line, Rectangle, Circle etc.	15.4.1	draw circles, triangles and other geometrical shapes;			*P
	15.4.2	make a colour scheme by computer;			*P
	15.4.3	draw various geometrical and other figures.			*P
16. Programming	**Candidates should be able to:**				
16.1 Programming	16.1.1	write a program using BASIC (statements commands and functions);			*P
	16.1.2	write a program to demonstrate simple arithmetic operations (like calculation of area of triangle, volume of cylinder and speed of object, conversion of temperature from C to F and vice-versa);			*P

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				K	U	A
	16.1.3	write a program to demonstrate use of formatted Input/Output statement, (calculation of grades of class for different students, selection of the largest number out of given 12 numbers without using list);				*P
	16.1.4	write a program for the use of iteration of statement, (Read 5 values from keyboard and find their mean gravity and compare the mean value against actual value 9.8 meters/sec^2);				*P
	16.1.5	write a program which reads 12 values in an array and after doing some arithmetic operations, print the desired results;				*P
	16.1.6	repeat the experiment at para 12.8.4 using a sub-routine named "average" and call this sub-routine in the main program.				*P
17. Boolean Algebra	**Candidates should be able to:**					
17.1 Boolean Constants and Variables	17.1.1	*describe Boolean constants and functions ;*			*	
	17.1.2	justify the significance of Boolean Algebra in conditional statements;				*
17.2 Logical Operations	17.2.1	demonstrate the Boolean operators AND, NOT, OR, NAND, NOR in a conditional statement;				*
17.3 Truth Table Boolean Laws and Theorems Karnaugh Map	17.3.1	demonstrate how Boolean operators can reduce complex patterns of data to a simple binary output in a truth table;				*
	17.3.2	*prove Boolean theorems with the help of mathematics properties.*				*

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4.   Scheme of Assessment

Class IX

Table 1: Number of Student Learning Outcomes by Cognitive Level

Topic No.	Topics	No. of Sub-topics	SLOs			Total
			K	**U**	**A**	
1.	Introduction to Computers	5	1	10	0	11
2.	Computer Components	3	3	5	0	8
3.	Input Devices and Output Devices	2	2	6	1	9
4.	Storage Devices	3	1	4	2	7
5.	Data Representation, Data Definition	5	3	3	2	8
6.	Introduction to Windows	3	0	2	6	8
7.	Word Processor	7	0	1	14	15
8.	Presentation Software (PowerPoint)	1	0	1	3	4
9.	Computer Software	6	3	11	3	17
	Total	**35**	**13**	**43**	**31**	**87**
	Percentage		**15**	**49**	**36**	**100**

**Table 2: Allocation of Marks for Multiple Choice Questions (MCQs),
Constructed Response Questions (CRQs) and Extended Response Questions (ERQs)**

Topic No.	Topic	No. of Sub-Topics	Marks			Total
			Multiple Choice Questions	Constructed Response Questions	Extended Response Questions	
1.	Introduction to Computers	5	6	5	7	18
2.	Computer Components	3				
3.	Input Devices and Output Devices	2	4	5	0	9
4.	Storage Devices	3				
5.	Data Representation, Data Definition	5	4	4	0	8
6.	Introduction to Windows	3	6	6	0	12
7.	Word Processor	7				
8.	Presentation Software (PowerPoint)	1				
9.	Computer Software	6	5	5	8	18
	Total:	**35**	**25**	**25**	**15**	**65**
	Practical (see Annex B)					10
	Total:					**75**

Table 3: Paper Specifications

Topic No.	Topics	Marks Distribution			Total Marks
1.	Introduction to Computers	MCQ 6 @ 1 Mark CRQ 1 @ 5 Marks *ERQ 1 @ 7 Marks Choose any ONE from TWO			18
2.	Computer Components				
3.	Input Devices and Output Devices	MCQ 4 @ 1 Mark CRQ 1 @ 5 Marks			9
4.	Storage Devices				
5.	Data Representation, data definition	MCQ 4 @ 1 Mark CRQ 1 @ 4 Marks			8
6.	Introduction to Windows	MCQ 6 @ 1 Mark CRQ 1 @ 6 Marks			12
7.	Word Processor				
8.	Presentation Software (PowerPoint)				
9.	Computer Software	MCQ 5 @ 1 Mark CRQ 1 @ 5 Marks ERQ 1 @ 8 Marks Choose any ONE from TWO			18
	Total	**MCQs 25**	**CRQs 25**	**ERQs 15**	**65**
	Practical				10
	Total				**75**

* Extended response questions (ERQs) will require answers in more descriptive form. The answers will be in a paragraph form rather than a word or a single sentence.

Class X

Table 4: Number of Student Learning Outcomes by Cognitive Level

Topic No.	Topics	No. of Sub-topics	SLOs K	SLOs U	SLOs A	Total
10.	Impact of Computers on Society	6	0	9	0	9
11.	Problem Solving	7	3	5	3	11
12.	Data Types	7	4	4	7	15
13.	Control Statements	2	2	1	5	8
14.	Arrays	2	1	0	3	4
15.	Sub-programs and File Handling	4	0	2	7	9
16.	Programming	1	0	0	6	6
17.	Boolean Algebra	3	0	1	4	5
	Total	**32**	**10**	**22**	**35**	**67**
	Percentage		**15**	**33**	**52**	**100**

Table 5: Allocation of Marks for Multiple Choice Questions (MCQs), Constructed Response Questions (CRQs) and Extended Response Questions (ERQs)

Topic No.	Topic	No. of Sub-Topics	Marks: Multiple Choice Questions	Marks: Constructed Response Questions	Marks: Extended Response Questions	Total
10.	Impact of Computers on Society	6	5	0	8	13
11.	Problem Solving	7	4	5	0	9
12.	Data Types	7	3	5	0	8
13.	Control Statements	2	5	5	0	10
14.	Arrays	2	1	4	0	5
15.	Sub-programs and File Handling	4	2	3	0	5
16.	Programming	1	3	0	7	10
17.	Boolean Algebra	3	2	3	0	5
	Total:	**32**	**25**	**25**	**15**	**65**
	Practical (see Annex B)					10
	Total:					**75**

Table 6: Paper Specifications

Topic No.	Topics	Marks Distribution			Total
10.	Impact of Computers on Society	MCQs 5 @ 1 Mark *ERQ 1 @ 8 Marks Choose any ONE from TWO			13
11.	Problem Solving	MCQs 4 @ 1 Mark CRQ 1 @ 5 Marks			9
12.	Data Types	MCQs 3@ 1 Mark CRQ 1 @ 5 Marks			8
13.	Control Statements	MCQs 5 @ 1 Mark CRQ 1 @ 5 Marks			10
14.	Arrays	MCQ 1 @ 1 Mark CRQ 1 @ 4 Marks			5
15.	Sub-programs and File Handling	MCQ 2 @ 1 Mark CRQ 1 @ 3 Marks			5
16.	Programming	MCQs 3 @ 1 Mark ERQ 1 @ 7 Marks Choose any ONE from TWO			10
17.	Boolean Algebra	MCQs 2 @ 1 Mark CRQ 1 @ 3 Marks			5
	Total:	**MCQs 25**	**CRQs 25**	**ERQs 15**	**65**
	Practical				10
	Total:				**75**

* Extended response questions (ERQs) will require answers in more descriptive form. The answers will be in a paragraph form rather than a word or a single sentence.

4.1 Tables 1 and 4 summarize the number and nature of SLOs in each topic in classes IX and X. This will serve as a guide in the construction of the examination paper. It also indicates that more emphasis has been given to Understanding (49% and 36%), Application and higher order skills (33% and 52%) to discourage rote memorization. Tables 1 and 4 however do not translate directly into marks.

4.2 There will be two examinations, one at the end of Class IX and one at the end of Class X.

4.3 In each class, the theory paper will be in two parts: paper I and paper II. Both papers will be of duration of 3 hours.

4.4 Paper I theory will consist of 25 compulsory, multiple choice items. These questions will involve four response options.

4.5   Paper II theory will carry 40 marks and consist of a number of compulsory, structured questions and a number of extended response questions. Each extended response question will be presented in an either/or form.

4.6   Practical examination will be conducted separate from the theory paper. It will be based on the list of practical activities listed in the examination syllabus.

4.7   All constructed response questions will be in a booklet which will also serve as an answer script.

4.8   Practical exams to assess performance skills will carry 10 marks in class IX and 10 marks in class X.

4.9   The practicals identified in the SLOs by a "P" should be carried out throughout the academic year. It is essential for each school to equip its computer lab with software, hardware, devices, etc. according to the requirements of the practicals. Each school will be responsible to make sure that each student is provided the opportunity to do the practicals.

        List of practicals is attached as annex B.

5.   Teaching-Learning Approaches and Classroom Activities

5.1   Computer Science is a practical subject therefore most parts of the syllabus will need to be supplemented by a range of practical exercises. Students should be taught the handling and use of a computer in a well-set computer lab.

5.2   Whenever new software is used, the teacher must demonstrate either on a large monitor screen or connected to the TV so that students can see the software and how it is used.

5.3   Case studies and small projects can be assigned to students on an individual basis or to be solved as a group

5.4   Students can be assigned to present their case studies or other projects in the form of a formal report using a computer.

5.5   Students should be encouraged to explore and question on topics related to computers to satisfy their quest for computer knowledge.

5.6   The computer itself is an important demonstration device that can be used to facilitate teaching.

5.7   Due to limited numbers of computers and also to enhance learning among students group work on computers should be encouraged and the concept of time sharing introduced on a practical basis.

5.8   Students can be taken on field trips to places where computers are used to provide them exposure to not only hardware but also software components.

6. Recommended Text and Reference Material

Recommended Books

1. Punjab Textbook Board. (2007). *Computer Science Textbook for Classes IX & X*. Lahore: Punjab Textbook Board.
2. Sindh Textbook Board. (2007). *Computer Science Textbook for Classes IX & X*. Jamshoro: Sindh Textbook Board.
3. National Book Foundation. *Computer Science Textbook for Classes IX & X*. Islamabad: National Book Foundation.

Reference Books

1. Kapadia, N. and Shah, M. K. (2003). *Exploring Computer Science: textbook for Classes IX and X*. Karachi: Oxford University Press.
2. NWFP Textbook Board. (2007). *Computer Science Textbook for Classes IX & X*. Peshawar: NWFP Textbook Board.
3. Baluchistan Textbook Board. (2007). *Computer Science Textbook for Classes IX & X*. Quetta: Baluchistan Textbook Board.

7. Definition of Cognitive Levels and Command Words

7.1 Definition of Cognitive Levels

Knowledge

This requires knowing and remembering facts and figures, vocabulary and contexts, and the ability to recall key ideas, concepts, trends, sequences, categories, etc. It can be taught and evaluated through questions based on: who, when, where, what, list, define, describe, identify, label, tabulate, quote, name, state, etc.

Understanding

This requires understanding information, grasping meaning, interpreting facts, comparing, contrasting, grouping, inferring causes/reasons, seeing patterns, organizing parts, making links, summarizing, solving, identifying motives, finding evidence, etc. It can be taught and evaluated through questions based on: why, how, show, demonstrate, paraphrase, interpret, summarize, explain, prove, identify the main idea/theme, predict, compare, differentiate, discuss, chart the course/direction, report, solve, etc.

Application

This requires using information or concepts in new situations, solving problems, organizing information and ideas, using old ideas to create new ones, generalizing from given facts, analysing relationships, relating knowledge from several areas, drawing conclusions, evaluating worth, etc. It can be taught and evaluated through questions based on: differentiate, analyse, show relationship, propose an alternative, prioritize, give reasons for, categorize, illustrate, corroborate, compare and contrast, create, design, formulate, integrate, rearrange, reconstruct/recreate, reorganize, predict consequences etc.

7.2   Definition of Command Words

Knowledge

Define: Means only a formal statement about a term or function without any examples.

Identify: Pick out, recognizing specified information from a given content or situation.

Name: Identify people, places and organizations.

Recognise: Involves looking at a given example and stating what it most probably is.

State: Implies a concise answer with little or no supporting argument, e.g. a numerical answer that can be obtained by inspection.

Understanding

Describe: State in words (using diagrams where appropriate) the main points of the topic. It is often used with reference either to a particular phenomenon or experiment. In the former instance, the term usually implies that the answer should include reference to (visual) observations associated with the phenomena.

Differentiate: Identify those characteristics which always or usually help us to tell two categories apart. A list of features is required.

Discuss: Express views in a logical and lucid way considering all aspects of a matter under discussion and draw conclusions.

Classify: State a basis for categorization of a set of related entities and assign examples to categorize.

Compare: List the main characteristics of two entities clearly identifying similarities (and differences).

Categorize: Put an element in a group on bases of its properties.

Explain: To make an idea/ situation/ problem clear by describing it in detail, revealing relevant data or facts.

Show: Demonstrate or prove by evidence and or by argument.

Application

Apply:	Use knowledge or principle to solve problems.
Arrange:	Put into a proper or systematic order.
Assign:	Putting data against a variable for doing a programme or a project to achieve certain objectives.
Change:	Implies switching from one programme to another or shifting from a given computer characteristic to a desired one.
Correct:	Make right or remove errors from the given text/ program.
Convert:	Shift or change the given programme or data into a different form with different characteristics.
Create:	Requires developing a new programme or a set of functions from one's own experience.
Demonstrate:	Show how one thing is related to another, usually by physical manipulation or experiment to show a computer related skill.
Design:	To devise/ propose a series of actions to achieve required results.
Draw:	Implies a simple free hand sketch or diagram. Care should be taken with proportions and the clear labeling of parts.
Edit:	Prepare for presentation by correcting, revising or adapting.
Insert:	Place or put into something e.g. table/ picture/ shapes/ header etc into documents.
Justify:	Provide evidence of understanding any concept or skill with sufficient grounds.
Make:	Putting different items together to develop a set of the desired data or functions.
Prove:	Establish the validity of a theory or a principle.
Remove:	Move or change something to no longer be present or in its previous position e.g. removing programs from the computer
Repeat:	Perform/execute an action/program again.
Run:	Carry out a process or program, as on a computer or a machine.

Select: Choose the desirable page layout from a given document.

Use: Deploy the required attribute in a constructed response or apply any computer skill of software in a practical way.

Write: Implies making a list of desired entities or functions.

SSC Scheme of Studies[3]

AKU-EB as a national board offers SSC and HSSC qualifications for both English and Urdu medium schools. The revised SSC Scheme of Studies issued by the Curriculum Wing was implemented from September 2007. Accordingly, each SSC subject will be taught across both the classes IX and X. The Science and Humanities group subjects are offered at SSC level. The marks allocated to subjects in the revised National Scheme of Studies of September 2007 have been followed.

SSC I and II (Class IX and X) subjects on offer for examination

SSC Part-I (Class IX) Science Group

Subjects	Marks			Medium
	Theory	Practical	Total	
English Compulsory-I	75	-	75	English
Urdu Compulsory-I **OR** Urdu Aasan **a OR** History and Geography of Pakistan-I **b**	75	-	75	Urdu Urdu English
Islamiyat-I **OR** Ethics-I **c**	*30	-	*30	English / Urdu
Pakistan Studies-I	*45	-	*45	English / Urdu
Mathematics-I	75	-	75	English / Urdu
Physics-I	65	10	75	English / Urdu
Chemistry-I	65	10	75	English / Urdu
Biology-I **OR** Computer Science-I	65	10	75	English / Urdu English
Total:	***495**	**30**	***525**	

SSC Part-II (Class X) Science Group

Subjects	Marks			Medium
	Theory	Practical	Total	
English Compulsory-II	75	-	75	English
Urdu Compulsory-II **OR** Sindhi **a OR** History and Geography of Pakistan-II**b**	75	-	75	Urdu Sindhi English
Islamiyat-II **OR** Ethics-II **c**	*45	-	*45	English / Urdu
Pakistan Studies-II	*30	-	*30	English / Urdu
Mathematics-II	75	-	75	English / Urdu
Physics-II	65	10	75	English / Urdu
Chemistry-II	65	10	75	English / Urdu
Biology-II **OR** Computer Science-II	65	10	75	English / Urdu English
Total:	***495**	**30**	***525**	

a. Candidates from the province of Sindh may appear in "Urdu Aasan" in SSC Part I and in "Sindhi" in Part II examination.

b. Foreign students may opt HISTORY and GEOGRAPHY OF PAKISTAN in lieu of Urdu Compulsory, subject to the Board's approval.

c. For non-Muslim candidates only.

* The above will be implemented in
    SSC Part I 2013 Examinations and onwards
    SSC Part II 2014 Examinations and onwards

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[3] Government of Pakistan September 2007. *Scheme of Studies for SSC and HSSC (Classes IX-XII).* Islamabad: Ministry of Education, Curriculum Wing.

SSC Part-I (Class IX) Humanities Group

Subjects	Marks	Medium
English Compulsory-I	75	English
Urdu Compulsory-I **OR** Urdu Aasan **a** **OR** History and Geography of Pakistan-I **b**	75	Urdu Urdu English
Islamiyat-I **OR** Ethics-I **c**	*30	English / Urdu
Pakistan Studies-I	*45	English / Urdu
General Mathematics-I	75	English / Urdu
Any three of the following Elective Subjects 1.　　**Geography-I 2.　　General Science-I 3.　　Computer Science-I (65+10 practical) 4.　　Economics-I 5.　　Civics-I 6.　　**History of Pakistan-I 7.　　**Elements of Home Economics-I 8.　　**Food and Nutrition-I (65+10 practical) 9.　　**Art & Model Drawing-I 10.　　**Business Studies-I 11.　　**Environmental Studies-I	225 (75 each)	English / Urdu English / Urdu English English / Urdu English / Urdu English / Urdu English / Urdu English / Urdu English English English
Total:	***525**	

SSC Part-II (Class X) Humanities Group

Subjects	Marks	Medium
English Compulsory-II	75	English
Urdu Compulsory-II **OR** Sindhi **a** History and Geography of Pakistan-II **b** **OR**	75	Urdu Sindhi English
Islamiyat-II **OR** Ethics-II **c**	*45	English / Urdu
Pakistan Studies-II	*30	English / Urdu
General Mathematics-II	75	English / Urdu
Any three of the following Elective Subjects 1.　　**Geography-II 2.　　General Science-II 3.　　Computer Science-II (65+10 practical) 4.　　Economics-II 5.　　Civics-II 6.　　**History of Pakistan-II 7.　　**Elements of Home Economics-II 8.　　**Food and Nutrition-II (65+10 practical) 9.　　**Art & Model Drawing-II 10.　　**Business Studies-II 11.　　**Environmental Studies-II	225 (75 each)	English / Urdu English / Urdu English English / Urdu English / Urdu English / Urdu English / Urdu English / Urdu English English English
Total:	***525**	

SSC Part-I and Part-II (Class IX-X) (Additional Subjects)

SSC Part I	SSC Part II	Marks	Medium
1.　　**Literature in English-I **d**	1.　　**Literature in English-II **d**	75 each	English
2.　　**Commercial Geography-I **d**	2.　　**Commercial Geography-II **d**		English
3.　　**Additional Mathematics-I **d**	3.　　**Additional Mathematics-II **d**		English

a.　　Candidates from the province of Sindh may appear in "Urdu Aasan" in SSC Part I and in "Sindhi" in Part II examination.

b.　　Foreign students may opt HISTORY and GEOGRAPHY OF PAKISTAN in lieu of Urdu Compulsory, subject to the Board's approval.

c.　　For non-Muslim candidates only.　　　d.　　Subject will be offered as Additional Subject.

*　　The above will be implemented in

　　　　　　SSC Part I 2013 Examinations and onwards　　　　SSC Part II 2014 Examinations and onwards

These subjects are offered <u>ONLY</u> in the May examination.

List of Practicals

Class IX

S. No.	Objective	Equipment	Software
1.	Start and shutdown process of a computer system	PC	Windows
2.	Familiarisation with all the windows icons	PC	Windows
3.	Use of a mouse for selection and opening of a file or folder	PC and a mouse	Windows
4.	Opening, creating, saving, deleting and printing files in MSWord	PC	Windows, Word
5.	Editing MSWord documents	PC	Windows, Word
6.	Formating of MSWord document	PC	Windows, Word
7.	Page setting and printing of MSWord document	PC and a printer	Windows, Word
8.	Preparation of slide show	PC	Windows

Class X

S. No.	Objective	Equipment	Software
1.	Writing a program to demonstrate simple arithmetic operations	PC	GWBASIC
2.	Writing a program to demonstrate the use of formatted Input/ Output statement along with conditional statement IF- THEN.	PC	GWBASIC
3.	Writing a program for the iteration of statement, (use of looping statements: FOR-NEXT and WHILE-WEND).	PC	GWBASIC
4.	Writing a program which reads 12 values in an array and after doing some arithmetic operations print the desired results	PC	GWBASIC
5.	Writing a program to draw a line, a rectangle, using system designed built –in functions for graphics.	PC	GWBASIC
6.	Writing a program to use a subroutine in main program	PC	GWBASIC