

**DAWOOD PUBLIC SCHOOL**

Computer Science

Course Outline for 2017-2018

Class IX

<b>August</b>	<b>Section1: Theory of Computer Science</b>  1.1 Data Representation 1.1.1 Binary Data 1.1.2 Hexadecimal 1.1.3 Data Storage
<b>September</b>	<b>Section1: Theory of Computer Science</b>  1.3 Hardware 1.3.1 Logic gates 1.3.3 Input device
<b>October</b>	<b>Section1: Theory of Computer Science</b>  1.3 Hardware 1.3.4 Output devices
<b>November</b>	<i>Revision</i>
<b>December</b>	<b>Mid-Year Examination</b>
<b>January</b>	<b>Section2: Practical Problem-solving and Programming</b>  2.1 Algorithm Design and Problem Solving 2.1.1 Problem-Solving and Design
<b>February</b>	<b>Section2: Practical Problem-solving and Programming</b>  2.2 Programming (continued) 2.1.2 Pseudocode
<b>March</b>	2.2 Programming (continued) 2.1.2 Pseudocode
<b>April</b>	<i>Revision</i>
<b>May</b>	<b>Final Examination</b>

## Month-Wise Distribution of Topics

### August

#### Section1: Theory of Computer Science

##### 1.1 Data Representation

###### 1.1.1 Binary Data

###### 1.1.2 Hexadecimal

###### 1.1.3 Data Storage

Contents	Activities or Learning resources
<p>BINARY AND HEXADECIMAL NOTATION:</p> <p>Conversion of Binary numbers to and from Denary</p> <ul style="list-style-type: none"> <li>▪ Perform conversions of binary and hexadecimal number to and from denary system</li> </ul> <p>Conversion of Hexadecimal numbers to and from Denary</p> <ul style="list-style-type: none"> <li>▪ Perform conversions of binary and hexadecimal number to and from denary system</li> </ul> <p>Use of hexadecimal numbers:</p> <ul style="list-style-type: none"> <li>▪ Identify the use of Hexadecimal in representing colors in HTML, representing MAC address, memory dumps, web address ,assembly and machine code</li> </ul> <p>Use of binary number system</p> <ul style="list-style-type: none"> <li>▪ For IP addressing of resources on the internet</li> <li>▪ Discuss and understand the concept of byte; also learn to calculate the memory requirements in form of Kb, Mb, Gb, Tb.</li> </ul> <p>DATA FORMATS:</p> <p>Formats of pictures, sounds, video, text and numbers</p> <ul style="list-style-type: none"> <li>▪ Identify common file standards: JPG, GIF, PDF, MP3, MPEG, and MIDI.</li> </ul> <p>Error detection &amp; correction method : parity check, check digits ,checksums, Automatic Repeat Request(ARQ)</p> <p>Types media files: MIDI &amp; MP3,MP4,jpeg</p> <p>Data compression: Lossless and lossy compression applied to music/video, photos, and text files</p> <ul style="list-style-type: none"> <li>▪ Understand the ways to detect and then correct errors: Parity check, check digits, checksums, ARQ(Automatic Repeat Request)</li> <li>▪ Differentiate between lossless &amp; lossy compression</li> </ul>	<p>The concepts will be demonstrated by solving questions on board.</p> <p>Binary counter – for example:</p> <p><a href="http://www.mathsisfun.com/binary-decimal-hexadecimal-converter.html">www.mathsisfun.com/binary-decimal-hexadecimal-converter.html</a></p> <p>Binary numbers at Computer Studies Unplugged: <a href="http://csunplugged.org/binary-numbers">http://csunplugged.org/binary-numbers</a></p> <p>Cisco binary game: <a href="http://forums.cisco.com/CertCom/game/binary_game_page.htm">http://forums.cisco.com/CertCom/game/binary_game_page.htm</a></p> <p>Hexadecimal counter – for example: <a href="http://www.mathsisfun.com/binary-decimal-hexadecimal-converter.html">www.mathsisfun.com/binary-decimal-hexadecimal-converter.html</a></p> <p>Simple comparisons at <a href="http://www.bbc.co.uk/schools/gcsebitesize/ict/hardware/1datastoragerev2.shtml">www.bbc.co.uk/schools/gcsebitesize/ict/hardware/1datastoragerev2.shtml</a></p> <p>Useful reinforcement material: <a href="http://computer.howstuffworks.com/bytes.htm">http://computer.howstuffworks.com/bytes.htm</a></p> <p><u>For Practice:</u> Past paper questions on Binary data: Q15: 7010_s12_qp_11 Q11:7010_w11_qp_11</p> <p>Practice questions to convert to and from GB,MB,KB</p> <p><u>Book Reference:</u> Unit 2</p> <p><u>Handout:</u> Will be shared with students</p>

## September

### Section1: Theory of Computer Science

#### 1.3 Hardware

##### 1.3.1 Logic gates

##### 1.3.3 Input device

Contents	Activities or Learning resources
<p><u>LOGIC GATES</u></p> <ul style="list-style-type: none"> <li>▪ Use logic gates to create electronic circuits.</li> <li>▪ Understand and define the functions of NOT, AND, OR, NAND, NOR and XOR (EOR) gates, including the binary output produced from all the possible binary inputs.</li> <li>▪ Draw truth tables and recognize a logic gate from its truth table.</li> <li>▪ Produce truth tables for given logic circuits.</li> <li>▪ Produce a logic circuit to solve a given problem.</li> <li>▪ Implement a logic circuit using ‘NAND’ gates only, by replacing each of the basic logic gate into its equivalent NAND gate circuit</li> </ul> <p><u>INPUT DEVICES</u></p> <ul style="list-style-type: none"> <li>▪ Describe the principles of operation of a range of input devices including; <ul style="list-style-type: none"> <li>○ Scanners, barcode readers, digital cameras(including CCTV cameras), keyboards, mice, touch screens, microphones ,QR code, RFID tags, sensors, Interactive whiteboards etc.</li> </ul> </li> <li>▪ Describe how these principles are applied to real-life scenarios, for e.g. <ul style="list-style-type: none"> <li>○ Use of Barcodes, QR codes ,RFID tags in supermarket</li> <li>○ Use of 2D, 3D scanners at airports.</li> <li>○ Use of microphone in Voice Recognition systems</li> </ul> </li> <li>▪ Describe how a range of sensors can be used to input data into a computer system, including: <ul style="list-style-type: none"> <li>○ Light, temperature, magnetic field, gas, pressure, moisture, humidity, pH/acidity/alkalinity and motion/infra-red.</li> </ul> </li> <li>▪ Describe how these sensors are used in real-life scenarios; for e.g. <ul style="list-style-type: none"> <li>○ Burglar alarm system</li> <li>○ Anti lock braking system</li> <li>○ Weather forecasting</li> <li>○ Street lights controlling system</li> </ul> </li> </ul>	<p><u>Book Reference:</u> Unit#11,Pg 274 (from Chris Leadbetter) Unit#3, (from David Watson and Helen Williams)</p> <p><u>Resource:</u> A handout based on the questions from past exams will be shared with the students.</p> <p>Simple logic simulator using standard symbols: <a href="http://logic.ly/demo/">http://logic.ly/demo/</a></p> <p>Downloadable logic gate simulator: <a href="http://www.softpedia.com/get/Others/Home-Education/Logic-Gate-Simulator.shtml">www.softpedia.com/get/Others/Home-Education/Logic-Gate-Simulator.shtml</a></p> <p>and <a href="http://www.logiccircuit.org/">www.logiccircuit.org/</a></p> <p>Websites such as <a href="http://computer.howstuffworks.com/">http://computer.howstuffworks.com/</a> <a href="http://en.wikipedia.org/wiki/Input_device">http://en.wikipedia.org/wiki/Input_device</a></p> <p><u>Book Reference:</u> ‘Unit# 3-Hardware’ Pg49-70</p> <p>Illustrated notes on sensors: <a href="http://www.O Levelict.info/theory/2/sensor/">www.O Levelict.info/theory/2/sensor/</a></p> <p>Notes on sensors: <a href="http://www.bbc.co.uk/schools/gcsebitesize/ict/measurecontrol/0computercontrolrev2.shtml">www.bbc.co.uk/schools/gcsebitesize/ict/measurecontrol/0computercontrolrev2.shtml</a></p> <p><u>Activity 5.6:</u> Pg# 104</p>

**October****Section1: Theory of Computer Science**

## 1.3 Hardware

## 1.3.4 Output devices

Contents	Activities or Learning resources
<p><b><u>OUTPUT DEVICES</u></b></p> <ul style="list-style-type: none"> <li>▪ Describe the principles of operation of a range of output devices, including: <ul style="list-style-type: none"> <li>○ Inkjet, laser and 3D printers</li> <li>○ 2D and 3D cutters</li> <li>○ speakers and headphones</li> <li>○ actuators(Buzzers ,motors, valves)</li> <li>○ Flat-panel display screens. (LED,LCD)</li> </ul> </li>   <li>▪ Describe how these principles are applied to real-life scenarios, for e.g. <ul style="list-style-type: none"> <li>○ Use of Inkjet printers for best off photos</li> <li>○ Use of Laser printer for large volume printing and fast printing</li> <li>○ Use of 3D Printers, 2D &amp; 3D Cutters in Automated industries.</li> <li>○ Role of actuators in Control Applications.</li> </ul> </li> </ul>	<p><b><u>Book Reference:</u></b> ‘Unit# 3-Hardware’ Pg71-78</p> <p>Websites such as  <a href="http://computer.howstuffworks.com/">http://computer.howstuffworks.com/</a>  <a href="http://en.wikipedia.org/wiki/Output_device">http://en.wikipedia.org/wiki/Output_device</a></p> <p><a href="http://www.bbc.co.uk/schools/gcsebitesize/ict/hardware/1datastoragerev2.shtml">www.bbc.co.uk/schools/gcsebitesize/ict/hardware/1datastoragerev2.shtml</a></p> <p>Websites such as:  <a href="http://en.wikipedia.org/">http://en.wikipedia.org/</a> which has entries for various related topics</p> <p><b><u>Videos:</u></b>  Short videos will be shown to further strengthen their concepts</p>

**November****Revision**

Revision Tests  
Practice worksheets  
Assignments  
Past Papers

**December**

**Mid-Year Examination**



## January

### Section2: Practical Problem-solving and Programming

#### 2.1 Algorithm Design and Problem Solving

##### 2.1.1 Problem-Solving and Design

##### 2.1.2 Pseudocode

Contents	Activities or Learning resources
<p><b>PROBLEM SOLVING:</b></p> <ul style="list-style-type: none"> <li>▪ Understand that every computer system is made up of subsystems. <ul style="list-style-type: none"> <li>○ Top-down design approach and discuss the advantages and disadvantage of top-down design approach</li> </ul> </li> <li>▪ Definition ,purpose and testing of Algorithms</li> <li>▪ Use of standard methods of solution.</li> <li>▪ Application of suitable test data and know the basic data types: String, Integer, and Character and Boolean.</li> <li>▪ Explain and apply test data: Normal data. Abnormal and extreme data.</li> <li>▪ Identify errors in given algorithms and suggest ways of removing these errors. <ul style="list-style-type: none"> <li>○ Differentiate between logical and syntax error</li> </ul> </li> <li>▪ Dry running of Pseudocodes/flowcharts using trace tables</li> <li>▪ Understand the need for validation and verification checks: <ul style="list-style-type: none"> <li>○ Range check, Length check/Limit check,</li> <li>○ type check (character, numeric, alphanumeric) Consistency,</li> <li>○ Format, Presence</li> <li>○ check digits and checksum</li> </ul> </li> <li>▪ Produce an algorithm for a given problem</li> <li>▪ Comment on the effectiveness of solution</li> </ul>	<p>An introduction to algorithmic thinking:  <a href="http://raptor.martincarlisle.com/Introduction%20to%20Algorithmic%20Thinking.doc">http://raptor.martincarlisle.com/Introduction%20to%20Algorithmic%20Thinking.doc</a></p> <p>PowerPoint presentation on flowcharts and program design:  <a href="http://staffweb.itsligo.ie/staff/bmulligan/Lectures/CSFr ench/French08.ppt">http://staffweb.itsligo.ie/staff/bmulligan/Lectures/CSFr ench/French08.ppt</a></p> <p>Some self-checking flowchart exercises, with outline structure and available operations:  <a href="http://www.cimt.plymouth.ac.uk/projects/mepres/book8/bk8i1/bk8_1i2.htm">www.cimt.plymouth.ac.uk/projects/mepres/book8/bk8i1/bk8_1i2.htm</a></p> <p>Pseudocode in 'Absolute beginner's guide to programming':  <a href="http://books.google.co.uk/">http://books.google.co.uk/</a></p> <p>Notes, quizzes and activities for data validation:  <a href="http://www.teach-ict.com/gcse_computing/ocr/databases/validating/home_validating.htm">www.teach-ict.com/gcse_computing/ocr/databases/validating/home_validating.htm</a></p> <p><a href="http://www.bbc.co.uk/schools/gcsebitesize/ict/databases/3datavalidationrev1.shtml">www.bbc.co.uk/schools/gcsebitesize/ict/databases/3datavalidationrev1.shtml</a></p> <p><a href="http://www.klbict.co.uk/gcse/theory/5_3/5_3_3_valid_verif.htm">www.klbict.co.uk/gcse/theory/5_3/5_3_3_valid_verif.htm</a></p> <p>Practice Question from past papers will be given for practice.</p> <p>Resource: Paper1 of 7010 from 2005 to 2014</p> <p>Book Reference: Unit 9 and 10</p>

## February & March

### Section2: Practical Problem-solving and Programming

#### 2.2 Programming (continued)


##### 2.2.1 Programming concepts

Contents	Activities or Learning resources
<ul style="list-style-type: none"> <li>▪ Verification of data. which includes:               <ul style="list-style-type: none"> <li>○ double entry</li> <li>○ screen/visual check</li> <li>○ parity check</li> <li>○ Checksum.</li> </ul> </li> <li>▪ Basic data types: Integer, Real, Char, String and Boolean</li> <li>▪ Declaration and use of variables and constants</li> <li>▪ Use the concept of sequence, selection, repetition, totaling and counting to solve problems using:               <ul style="list-style-type: none"> <li>○ Selection statements (IF...THEN...ELSE... &amp; Case...OF...OTHERWISE...)</li> <li>○ Repetition loops (FOR...NEXT, REPEAT...UNTIL, WHILE...DO)</li> </ul> </li> <li>▪ Use of Operators(+, -, *, /, ^, ←, &lt;, &gt;, &lt;&gt;, &lt;=, &gt;=)</li> </ul>	<p>Some simple tasks in Scratch:  <a href="http://www.teach-ict.com/programming/scratch/scratch_home.htm">www.teach-ict.com/programming/scratch/scratch_home.htm</a></p> <p>Control programming:  <a href="http://apps.dataharvest.co.uk/index.php?main_page=product_info&amp;cPath=2_21_8&amp;products_id=9">http://apps.dataharvest.co.uk/index.php?main_page=product_info&amp;cPath=2_21_8&amp;products_id=9</a></p> <p>Flowol website:  <a href="http://www.flowol.com/Default.aspx">www.flowol.com/Default.aspx</a></p> <p>Some LOGO websites and ideas:  <a href="http://www.mathcats.com/gallery/logodownloadinfo.html">www.mathcats.com/gallery/logodownloadinfo.html</a></p> <p>Activity 9.9. to 9.13 Pg#185</p> <p>Book Reference:            End of chapter questions,Pg#197-201</p> <p>Activity 10.4: Pg# 208            Activity 10.5 : Pg#210            Activity 10.6: Pg# 212            End of chapter questions: Pg#216-218            End of chapter question: Pg# 241</p>

## April Revision

Contents
Revision Tests Practice worksheets Assignments Past Papers

## May

<b>Final Exams</b> 
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