Hardware and Software

Learning Objectives

After completing this lesson, students will be able to:

- identify the software and hardware of a computer.
- distinguish the features of hardware and software.
- recognize different types of software.
- identify some Open source software and utilize them effectively.

GEGD2H

Introduction

Computer is a device comprising both hardware and software. The functions of hardware and software combines together to make the Computer functional. A hardware device helps to enter input information. The software processes the input data and gives the output in the monitor, a hardware device. Thus, a computer is like a human body, where human body is the hardware and soul is the software.

27.1 Hardware

Hardware is the parts of a computer which we can touch and feel. Hardware includes Input and Output devices, Cabinet, Hard Disk, Mother Board, SMPS, CPU, RAM, CD Drive and Graphics Card.

Figure 27.1 Hardware of a computer

DO YOU KNOW? Email existed before the World Wide Web.

27.2 Software

Hardware is lifeless without software in a computer. Software are programmed and coded applications to process the input information. The software processes the data by converting the input information into coding or programmed language. Touching and feeling the software is not possible but we can see the functions of the software in the form of output.

27.3 Types of Software

The software is divided into two types based on the process. They are:

1. System software (Operating System)
2. Application software

27.3.1 System software

System software (Operating system) is a software that makes the hardware devices process the data fed by the user and to display the result on the output devices like Monitor. Without the operating system, computer cannot function on its own. Some of the popular operating system are Linux, Windows, Mac, Android etc.

27.3.2 Application Software

Application software is a program or a group of programs designed for the benefit of end user to work on computer. The application programs can be installed in the hard disk for the usage on a particular computer. This type of application program completes one or more than one works of the end user. The following are the examples of application program: Video player, Audio player, Word processing software, Drawing tools, Editing software, etc.

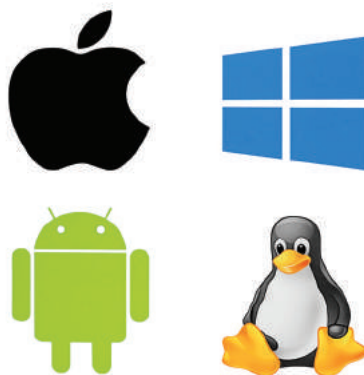SYSTEM SOFTWARE V/S APPLICATION SOFTWARE

Figure 27.2 System and Application Software

27.4 System and Application Software types

The operating system and application software are available in two forms. They are:

1. Free and Open source
2. Paid and Proprietary Software

27.4.1 Free and Open source

Free and open software is available at free of cost and can be shared to many end users. Free software is editable and customizable by the user and this leads to updation or development of new software. Examples of Free and Open source software are: LINUX, Open office, Geogebra etc.

27.4.2 Paid and Proprietary Software

These are softwares that need a license to use it. They have to be paid for using either permanently or temporarily. The license of the software would not be provided unless it is purchased. Similarly the end users are legally prohibited to steal the software program or to use the pirated version of the Paid and Proprietary Software. Some of the examples of Paid and Proprietary Software are: Windows, Microsoft office, Adobe Photoshop, etc.

TEXTBOOK EXERCISES

I. Choose the correct answer.

1. Find out the part that is not found in CPU?
   a. Mother Board
   b. SMPS
   c. RAM
   d. Mouse

2. Which of the following is correct?
   a. Free and Open source
   b. Free and Traditional software
   c. Passive and Open source
   d. Passive and Traditional source

3. LINUX is a
   a. Paid Software
   b. Licensed Software
   c. Free and Proprietary software
   d. Free and Open source software

4. Find out the Paid and Proprietary software from the given list.
   a. Windows
   b. MAC OS
   c. Adobe Photoshop
   d. All the above

5. _____ is an Operating System.
   a. Android
   b. Chrome
   c. Internet
   d. Pendrive

II. Match the following.

MAC OS	-	Free and Open source Software
Software	-	Paid and Proprietary Software
Hardware	-	Input Device
Keyboard	-	RAM
LINUX	-	Geogebra

III. Answer in brief.

1. What is Hardware and Software?
2. What do you mean by Operating System? How it Works?
3. What is Free and Open Source Software? Give any two examples?

PRACTICALS

PRACTICAL - TABLE OF CONTENTS

Sl. No.	Name of the Experiment	Time
1.	To find the diameter of a spherical body	40 minutes
2.	To find the thickness of given iron nail	40 minutes
3.	Melting point of wax	40 minutes
4.	Measurement of volume of liquids	40 minutes
5.	Identification of adaptations in animals	40 minutes
6.	Identification of plant and animal tissues	40 minutes
7.	To detect the adulterants in food samples	40 minutes
8.	Identification of microbes	40 minutes
9.	Economic biology	40 minutes
10.	Identification of adaptations in plants	40 minutes

Aim:

To determine the diameter of a spherical body using Vernier Caliper.

Apparatus required:

Vernier Caliper, given spherical body (cricket ball).

Formula:

(i) Least count (LC) =1 Main scale division -1 Vernier scale division

LC = 1mm – 0.9 mm

LC = 0.1 mm (or) 0.01 cm

(ii) Diameter of the spherical object (d) = M.S.R. + (VC × LC) ± ZC cm

where,   MSR -   Main Scale Reading

  VC   -   Vernier Coincide

  LC   -   Least Count. (0.01 cm)

  ZC   -   Zero Correction.

Procedure:

- Find the least count of the Vernier caliper.
- Find the zero correction of the Vernier caliper.
- Fix the object firmly in between the two lower jaws of the Vernier.
- Measure the main scale reading and the Vernier scale coincidence.
- Repeat the experiment by placing the jaws of the Vernier at different position of the object.
- Using the formula find the diameter of the object.

Least Count (LC): 0.01cm   Zero Correction (ZC): _____

Sl. No.	Main Scale Reading (MSR) cm	Vernier coincidence (VC)	Diameter of object d = MSR + (VC × LC) ± ZC (cm)
1			
2			
3			

Average _____cm

Result: The diameter of the given spherical object (Cricket ball) is _____ cm

II. TO FIND THE THICKNESS OF GIVEN IRON NAIL

Aim:

To find the thickness of the given iron nail.

Apparatus required:

Screw gauge and iron nail

Formula:

(i) Least Count (LC) = $\dfrac{\text{Pitch scale Reading}}{\text{No of divisions in the Head scale}}$

(ii) Thickness (t) = Pitch scale Reading (PSR) +

Head scale coincidence (HSC) × Least Count (LC)] ± zero correction

$$t = PSR + (HSC \times LC) \pm ZC$$

Error:

(i) If positive error is 5 points, for zero correction, subtract 5 points.

$$t = PSR + (HSC \times LC) - ZC$$
$$t = PSR + (HSC \times LC) - 5$$

(ii) If negative error is 95 points, for zero correction add 5 points (100 -95 =5).

$$t = PSR + (HSC \times LC) + ZC$$
$$t = PSR + (HSC \times LC) + 5$$

(iii) If no correction is needed, $t = PSR + (HSC \times 0.01) \pm 0$

Procedure:

* The Least count of screw gauge is 0.01 mm.
* The zero error is to be found when the two faces of the screw gauge touch each other.
* Then place the iron nail between the two faces of the screw gauge. The pitch scale reading (PSR) and head scale coincidence (HSC) are to be noted.
* Repeat the process by placing other parts of the iron nail in the screw gauge.
* Tabulate the readings.

Zero corection: Least count: 0.01 mm

Sl. No.	Pitch Scale Reading PSR (mm)	Head Scale Coincidence (HSC)	Thickness of the iron nail $t = PSR + (HSC \times LC) \pm ZC$ (mm)
1			
2			
3			

Average: _____ cm

Result: The diameter (Thickness) of the iron nail is _____ mm.

Aim:

To determine the melting point of wax using cooling curve.

Principle:

The determination of melting point is based on latent heat which is the amount of heat required to change a unit mass (1gm) of a substance from one state to another state without changing its temperature.

Materials Required:

Beaker, burner, thermometer, boiling tube, retort stand and clamp,wire gauze, tripod stand, candle wax, stop watch, bowl of sand.

Procedure:

- Melt the wax in a warm water bath.
- When the wax is melted entirely, remove it from the bath, dry it and then bury it in sand.
- Record the temperature each 30 seconds while the liquid is being converted to solid.
- At the same time watch for constant temperature at which liquid and solid are present.

Melting point of wax= Constant Temperature over a period of time
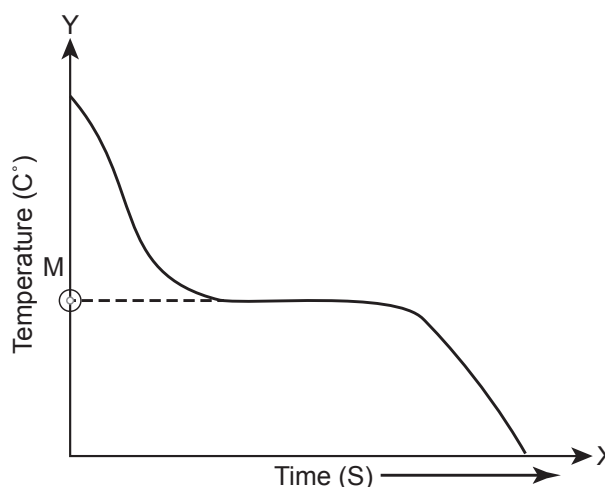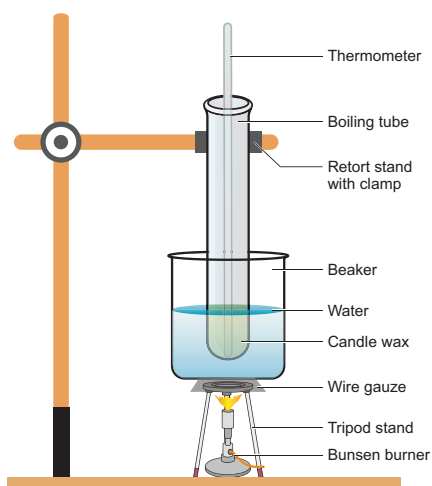
Observation and Tabulation:

S.No	Time (Second)	Temparature

The temperature at the point M denotes the melting point of wax

Suggestion: With the help of ICT corner, the teacher can show the live video of the experiment of melting point of wax using the link www.kau.edu.sa

IV. MEASUREMENT OF VOLUME OF LIQUIDS

Aim:

To measure the volume of given colourless and coloured liquids.

Materials required:

Pipette (20ml), sample liquids and beakers

Procedure:

Take a 20 ml pipette. Wash it thoroughly with water and then rinse it with the given liquid. Insert the lower end of the pipette into the given liquid and suck the solution slowly till the solution rises well above the circular mark on the stem. Take the pipette out of the mouth and quickly close it with the fore finger. Take the pipette out the liquid and keep it such a way that the circular mark on the stem is at the level of the eyes. Now slowly release the fore finger to let the liquid drop out until the lower meniscus touches the circular mark on the stem. If the liquid in the pipette is exactly 20 ml, this can be transferred to an empty beaker by removing the fore finger.

Tabulation

Sl. No.	Name of the liquid	Colour of the liquid	Nature of the meniscus	Volume of the liquid
1				
2				
3				

Report: Exactly 20 ml of various liquids are measured using a standard 20 ml pipette.

Note:

1. Keeping the circular mark on the stem of the pipette above or below the level of the eyes will lead to error.
2. When colored liquids are measured, the upper meniscus should be taken into account.
3. Never suck strong acids or strong alkalis using a pipette.

V. IDENTIFICATION OF ADAPTATIONS IN ANIMALS

Aim:

To identify the given vertebrate animals and list out the adaptations seen in them.

Required specimens:

1. Pisces (Fish), 2. Amphibian (Frog), 3. Reptile (Calotes), 4. Aves (Dove), 5. Mammal (Rat)

The following adaptations are noted.

Sl. No.	Name of the animal	Habitat	Body structure	Body covering	Locomotory organs
1	Fish				
2	Frog				
3	Calotes				
4.	Dove				
5.	Rat				

VI. IDENTIFICATION OF PLANT AND ANIMAL TISSUES

Aim:

To identify the structural features of plant and animal tissues from permanent prepared slides.

Observation:

Identify the given plant and animal tissues.

a) Simple tissues- parenchyma, collenchyma, sclerenchyma

b) Complex tissues-xylem and phloem

c) Epithelial tissue- columnar epithelium, ciliated epithelium

d) Connective tissue- section of bone

e) Muscle tissue- skeletal muscle, smooth and cardiac muscle

f) Nerve tissue

Draw a labelled sketch and write the location and function of the tissues observed.

VII. TO DETECT THE ADULTERANTS IN FOOD SAMPLES

Aim:

To detect the adulterants in the given samples.

Requirements:

Beakers, glass bowl, spoon and match box.

Materials required:

Given samples: pepper (A), honey (B), sugar (C), chilli powder (D), green peas (E) and water.

Procedure:

- Take 5 beakers with water and label it as A, B, C, D, E.

- Take samples A, B, C, D, E and add to the respective beaker.

- Observe the changes in each beaker.

- Record your observations.

Observation:

Sl. No.	Sample	Observation	Indication
1.	A		
2.	B		
3.	C		
4.	D		
5.	E		

VIII. IDENTIFICATION OF MICROBES

Aim:

To identify the different types of microbes (Bacteria and Virus).

Observation:

To observe the following with the help photograph/picture/permanent slide using a compound microscope/model/biovisual chart.

a. *Escherichia coli*

b. *Vibrio cholerae*

c. *Lactobacillus*

d. *Retrovirus (HIV)*

Answer the following:

a. Draw a neat labelled diagram.

b. Write the shape of the bacteria and virus observed.

c. Mention the structural details of the bacteria and virus.

d. Indicate its microbial importance/disease caused.

Aim:

To identify the plants and animals of economic importance.

Observation:

To observe the following using specimen/photograph/picture/model.

a. **Biofertilizer** – *Rhizobium*

b. **Medicinal plants** – Nilavembu, *Aloe vera*

c. **Mushroom** - *Agaricus bisporus*

d. **Indigenous cattle breed** - Umblachery

e. **Indian major carp** - *Catla catla*

f. **Type of Honey bees** - Queen bee, Worker bee

Answer the following:

a. Draw a neat labelled sketch

b. Write its economic importance

X. IDENTIFICATION OF ADAPTATIONS IN PLANTS

Aim:

To identify the given plant specimen and list out its adaptations

1. Mesophytic plant – Tomato or Brinjal plant
2. Xerophytic plant – *Opuntia*
3. Aquatic plant – *Eichhornia sp*
4. Insectivorous plant – *Nepenthes*

Observation:

The given plants are identified and the following adaptations are noted.

1.

2.

3.

4.

5.

GLOSSARY

Absorption	–	உட்கவர்தல், உறிஞ்சுதல்
Abundant Elements	–	அதிக அளவு காணப்படும் தனிமம்
Acceleration	–	முடுக்கம்
Adipose tissue	–	நிணத்திசு. இரத்தச்சவ்வு, கொழுப்பிழையம்
Adulteration	–	கலப்படம்
Aestivation	–	கோடைகால உறக்கம்
Alkalis	–	எரிகாரங்கள்
Allotropes	–	புறவேற்றுமை வடிவம்
Alloys	–	உலோகக் கலவைகள்
Alternating current	–	மாறு மின்னோட்டம்
Amorphous	–	படிக வடிவமற்ற
Animals	–	விலங்குகள்
Anion	–	எதிர்மின் அயனி
Aquaregia	–	இராஜதிராவகம்
Asteroid	–	சிறுகோள்கள்
Atomic number	–	அணு எண்
Atomic Structure	–	அணு அமைப்பு
Autotrophic	–	தற்சார்பு
Bell jar	–	மணி ஜாடி
Bilateral Symmetry	–	இரு பக்கச் சமச்சீர்
Biogeochemical Cycle	–	உயிர் புவி வேதியியல் சுழற்சி
Biological Oxidation	–	உயிரியியல் ஆக்ஸிசனேற்றம்
Buccal cavity	–	வாய்க்குழி
Canning	–	கலனடைத்தல்
Cardiac muscle	–	இதயத்தசை
Cartilage	–	குருத்தெலும்பு
Catalyst	–	கிரியா ஊக்கி (வினையை வேகப் படுத்தும் தனிமம்)
Catenation	–	சுய சகப்பிணைப்பு
Cation	–	நேர்மின் அயனி
Centrifugal force	–	மைய விலக்கு விசை
Centripetal force	–	மையநோக்கு விசை
Chemical bond	–	வேதிப்பிணைப்பு

chemotherapy	–	வேதிய சிகிச்சை முறை
Coelom	–	உடற்குழி
Colloidal solution	–	கூழ்ம கரைசல்
Complex tissue	–	கூட்டுத்திசு
Compound epithelium	–	கூட்டு புறப்படலம்
Compounds	–	சேர்மம்
Computer	–	கணினி
Connective Tissue	–	இணைப்புத்திசு, இணைப்பிழையம்
Coordinate covalent bond	–	ஈதல் சகபிணைப்பு
Covalent bond	–	சக பிணைப்பு
Crystallization	–	படிகமாதல்
Deformation	–	உருக்குலைவு
Dental Formula	–	பற்சூத்திரம்
Dialysis	–	கூழ்மப்பிரிப்பு
Diploblastic	–	ஈரடுக்கு
Direct current	–	நேர் மின்னோட்டம்
Displacement	–	இடப்பெயர்ச்சி
Distillation	–	வடிகட்டுதல்
Ductile	–	கம்பியாக நீட்டக் கூடிய
Echolocation	–	எதிரொளியிடம்
Ectoderm	–	புறஅடுக்கு
Electric cell	–	மின்கலம்
Electric circuit	–	மின்சுற்று
Electric energy	–	மின்னாற்றல்
Electrical resistance	–	மின்தடை
Electrochemical Cell	–	மின்வேதிக்கலம்
Electrode	–	மின்வாய்
Electrolyte	–	மின்பகு திரவம்
Electromagnet	–	மின்காந்தம்
Electrostatic	–	நிலைமின்னியல்
Elements	–	தனிமம்
Endangered species	–	அழிவின் விளிம்பில் உள்ள சிற்றினங்கள்
Endoderm	–	அகஅடுக்கு
Equator	–	பூமத்திய ரேகை

Excretion	–	கழிவு நீக்கம்
Fixed resistor	–	நிலையான மின்தடை
Flame cell	–	சுடர் செல்
Force	–	விசை
Forensic Chemistry	–	தடய வேதியியல்
Fossil water	–	புதைபடிவ நீர்
Frequency	–	அதிர்வெண்
Fuse	–	மின்னுருகு இழை
Generator	–	மின்னியற்றி
Genus	–	பேரினம்
Geotropism	–	புவிநாட்டம்
Glomerular filtration	–	குளாமருலர் வடிகட்டுதல்
Heterogeneous	–	பல படித்தான தன்மை
Heterotrophic	–	பிறசார்பு
Hibernation	–	குளிர்கால உறக்கம்
Homoeothermic Animal	–	வெப்ப இரத்த விலங்கு
Homogenous	–	ஒரு படித்தான தன்மை
Hydrophytes	–	நீர்வாழ்த் தாவரங்கள்
Hydrotropism	–	நீர் நாட்டம்
Immunization	–	நோய்த்தடுப்பு
Inert gases / Noble gases	–	அரிய வாயு / மந்த வாயு
Inner Transition Elements	–	உள் இடை நிலைத் தனிமம்
Input	–	உள்ளீட்டகம்
Internal energy	–	அகஆற்றல
Iron filings	–	இரும்புத் துகள்கள்
IUPAC	–	தூய மற்றும் பயன்பாட்டு வேதியலுக்கான சர்வதேசக் கழகம்
Kingdom	–	உலகம்
Lamp Black	–	விளக்கு கரி
Latent heat	–	உள்ளுறை வெப்பம்
Least count	–	மீச்சிற்றளவு
Levitate	–	மிதத்தல்
Ligament	–	தசை நாண், தசை நார்
Longitudinal waves	–	நெட்டலைகள்
Malleable	–	தகடாகும் தன்மையுடைய

Mantle	–	மேன்டல் உறை
Mass number	–	நிறை எண்
Meiosis	–	குன்றல் பிரிவு, ஒடுக்கற் பிரிவு
Melting	–	உருகுதல்
Mesoglea	–	நடு அடுக்கு
Metalloids	–	உலோகப் போலிகள்
Meteorological	–	வானிலை ஆய்வு
Mixture	–	கலவை
Momentum	–	உந்தம்
Motion	–	இயக்கம்
nano	–	நூறு கோடியில் ஒன்று என்பதன் முன்னொட்டு ($10-9$)
Nocturnal	–	இரவில் இயங்கும்
Non polar solvant	–	முனைவற்ற கரைப்பான்
Notochord	–	முதுகு நாண்
Nucleus	–	அணு உட்கரு
Octaves	–	எண்மம்
Octet rule	–	எண்ம விதி
Olericulture	–	காய் கறி மற்றும் உணவுத்தாவரங்களை வளர்த்தல்
Operculum	–	செவுள் மூடி
Optical fibers	–	ஒளி இழை
Orbital Velocity	–	சுற்றியக்கத் திசைவேகம்
Order	–	வரிசை
Output	–	வெளியீட்டகம்
Oxidation	–	ஆக்ஸிஜனேற்றம்
Oxidation number	–	ஆக்ஸிஜனேற்ற எண்
Pasteurization	–	பாஸ்டர் பதனம் / பாஸ்டிரை சேஷன்
Penetrate	–	ஊடுருவுதல்
Permanent Tissues	–	நிலைத்த திசுக்கள்
Pharmacology	–	மருந்தியல்
Phloem	–	புளூயம் (பட்டையம்)
Photosynthesis	–	ஒளிச்சேர்க்கை
Phototropism	–	ஒளிநாட்டம்
Phylum	–	தொகுதி
Piston	–	உந்து தண்டு

Plane mirror	–	சமதள ஆடி
Planet	–	கோள்
Plants	–	தாவரங்கள்
Poikilothermic Animal	–	குளிர் இரத்த விலங்கு
Polymorphism	–	பல்லுருவமைப்பு
Potential difference (Voltage)	–	மின்னழுத்த வேறுபாடு
Potential difference (Voltage)	–	மின்னழுத்த வேறுபாடு
Preservatives	–	பதப்படுத்திகள்
Pressure	–	அழுத்தம்
Propagation	–	பரவுதல்
Pump	–	இறைப்பான்
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Zero Valence	–	சுழி இணைதிறன்

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