Biology (130 MARKS)

Question 1 (52)

(*a*) plant cell (3)

cell wall // chloroplasts // large vacuole // rectangular/regular/definite/rigid/fixed structure/shape (3)

(*b*)(*i*) fight infection // produce antibodies // engulf (destroy bacteria) // kill germs (3)

(*ii*) transport oxygen (3)

(*c*)(*i*) excrete urine/water/salts/urea (from blood) // filter blood // produce urine // osmoregulation (3)

(*ii*) water // salt(s) // urea // urine (3)

(*d*)(*i*) anthrax // bubonic plague // cholera // diphtheria // food poisoning // meningitis // pneumonia // syphilis // tetanus // tonsillitis // tuberculosis // typhoid *etc.* (3)

(*ii*) chicken pox // (common) cold // cold sores // HIV //AIDS // influenza /flu // measles // meningitis // mumps // pneumonia // polio *etc.* (3)

(*e*)(*i*) sodium hydroxide // copper sulfate // potassium sodium tartrate // biuret (reagent/solution) (3)

(*ii*) violet / purple *(do <u>not</u> accept "blue" or "blue-black")* (3)

(*f*) (*i*) presence of a backbone / spine / vertebra(e) (3)

(*ii*) consumer (3)

(*g*)(*i*) 23 (3)

(*ii*) DNA (deoxyribonucleic acid) // protein (3)

(*h*)(*i*) **A** in fallopian tube (3)

(*ii*) **B** in the uterus (3)

(*iii*) any named method of contraception **(2)**

correct explanation **(2)**

Question 2 (39)

(*a*)(*i*) radius (3)

ulna (3)

(*ii*) biceps/**X** contracts/shortens (and triceps/**Y** relaxes/lengthens) (3)

triceps/**Y** contracts/shortens (and biceps/**X** relaxes/lengthens) (3)

(*iii*) ligaments join bones to each other (3)

tendons join bones to muscles (3)

(*iv*) hinge joint *(accept "synovial joint")* (3)

(*v*) fused joint (3)

(*b*)(*i*) regions above/below lens indicated (3)

(*ii*) changes the shape of the lens // accommodation (3)

(*iii*) allows light to enter the eye (3)

(*iv*) sensory nerve (3)

Award 6 marks for first correct answer in 2 (b)

Question 3 (39)

(*a*)(*i*) add (anhydrous) copper sulfate/$CuSO_4$ // add cobalt chloride (paper)/$CoCl_2$ (3)

turns (from white to) blue // turns (from blue to) pink *(accept red)* (3)

(mis-matches from above are not allowed)

(*ii*) to ensure water comes from leaves/plant // to ensure that water does not come from soil (3)

(*iii*) transpiration (3)

(*iv*) xylem (3)

(*b*)(*i*) **X** in an anther (3)

Y in an ovary (3)

(*ii*) (coloured petals) attract insects // transport pollen // pollination **(6)**

(*iii*) **State *or* show**

seeds, dry cotton wool, open to the air in any one of **ABC** (3)

seeds, moist cotton wool, open to the air in another of **ABC**, kept in refrigerator (3)

seeds, cotton wool with (cooled) boiled water and layer of oil in third of **ABC** (3)

seeds, moist cotton wool, open to the air in **D** (3)

[Diagram must have at least one label produced by student; no labelled diagram – deduct [3] marks]

Chemistry (130 MARKS)

Question 4 (52)

(*a*)(*i*) any valid ionic substance, e.g. sodium chloride (3)

(*ii*) charges are free to move (3)

(*b*)(*i*) water that does not (easily) form a lather (with soap) (3)

(*ii*) boiling // distilling // ion-exchange // deioniser // sodium carbonate (washing soda / bath salts) (3)
(do <u>not</u> accept named product)

(*c*) calcium chloride // carbon dioxide // water (2 × 3)

(*d*) less pollution/waste // less need for extraction/production of raw materials // plastics take a long time to decompose // putting plastics in landfill is unsightly *etc.* (2 × 3)
(any two <u>specific</u> reasons)

(*e*)(*i*) to help the particles to settle // to help small particles clump together (3)

(*ii*) to help keep teeth healthy (3)

(*f*) (*i*) prevents (iron or steel from) rusting (3)

(*ii*) Zn (3)

(*g*)(*i*) one that has the highest possible concentration of solute (at a given temperature) (3)

(*ii*) crystals (of copper sulfate will come out of solution) (3)

(*h*)(*i*) because it reacts with/not exposed to oxygen/water (3)

(*ii*) lithium // potassium // rubidium // caesium // francium (3)

(*iii*) hydrogen **(2)**

(*iv*) burns with a (loud) ‘pop’ **(2)**

Question 5 (39)

(*a*)(*i*) (Liebig) condenser (3)

(*ii*) to condense/cool the vapour (3)

(*iii*) distillate (3)

(*iv*) Bunsen burner // hot-plate // (retort) stand // tubing // anti-bumping granules (3)

(*b*)(*i*) a mixture of metals (with other elements) (3)

(*ii*) can be hammered/beaten into shape/thin sheets (3)

(*iii*) copper (3)

(*c*)(*i*) **A** – burette (3)
B – pipette (3)

(*ii*) litmus // methyl orange // phenolphthalein *etc.* (3)
red // red // colourless *(do <u>not</u> accept "clear")* (3)
blue // yellow // pink (3)
(answers must be matched)

(*iii*) $HCl + NaOH \rightarrow NaCl + H_2O$ (3)

Question 6 (39)

(*a*)(*i*) nitrogen (3)

(*ii*) carbon dioxide // water (vapour) // argon // neon // helium // krypton // methane // radon (3)

(*b*)(*i*) hydrogen peroxide (3)

(*ii*) a substance that changes the rate of a reaction but is not used up in the reaction (3)

manganese dioxide // potassium iodide (3)

black // white (3)

(mis-matches from above are not allowed)

(*iii*) (largely) insoluble in water // less dense than water (3)

relights a glowing splint (3)

(*c*)(*i*) atoms of the <u>same</u>... element // atomic number // number of protons (3)

with <u>different</u>... // mass number // number of neutrons (3)

(answers do <u>not</u> need to be matched)

(*ii*) eight / 8 (3)

(*iii*) atom(s) indicated, showing a 2, 6 arrangement of electrons (3)

overlap of outer energy levels with four electrons shared, two from each atom (3)

Physics (130 MARKS)

Question 7 (52)

(*a*) pressure = force ÷ area *(stated or implied)* (3)
40000 (Pa) (3)

(*b*) level of alcohol/liquid would fall (3)
alcohol/liquid contracts (when cooled) (3)

(*c*) light travels in straight lines // light refracts (2 × 3)

(*d*)(*i*) the nail becomes magnetic (3)
(*ii*) it will pick up small pieces of iron/steel // has an effect on a compass (3)

(*e*) sound needs a medium/material to travel through // correct reference to vacuum **(6)**

(*f*) 1st box – earth *(do <u>not</u> accept colour)* **(2)**
2nd box – neutral *(do <u>not</u> accept colour)* **(2)**
3rd box – live *(do <u>not</u> accept colour)* **(2)**

(*g*) the white can // can on the left (3)
black surfaces radiate heat better // white surfaces radiate heat less well (3)

(*h*)(*i*) work = force × distance *(stated or implied)* (3)
96000 (J) **(2)**

(*ii*) time = distance ÷ speed *(stated or implied)* (3)
1508 (s) // 25.1 (minutes) // 480π (s) **(2)**

Question 8 (39)

(*a*)(*i*) because apples are less dense than water (3)

(*ii*) **State *or* show**

find the mass of the apple using a (mass/electronic) balance (3)

graduated cylinder with water // overflow can filled with water (3)

apple submerged (3)

difference in volumes of water // volume collected from overflow can (3)

density = mass ÷ volume (3)

[Diagram must have at least one label, no labelled diagram – deduct [3] marks]

(*b*)(*i*) liquid (3)

(*ii*) solid (3)

(*iii*) heat loss // latent heat // change of state // no change in temperature (3)

Award 6 marks for first correct answer in 8 (b)

(*c*)(*i*) sunlight causes plants to make (chemical) energy/fuel // photosynthesis (3)

(*ii*) sunlight evaporates water to cause precipitation/rainfall (3)

Award 6 marks for first correct answer in 8 (c)

Question 9 (39)

(*a*) correct reference to friction // water acting as a lubricant **(6)**

(*b*)(*i*) ammeter (3)

(*ii*) voltmeter *(do <u>not</u> accept "voltameter")* (3)

(*iii*) light emitting diode (3)

(*c*)(*i*) correct plotting of data points **(5 × 1)**

curve showing good distribution **(4)**
(ignore the region of the curve drawn close to the origin)

(*ii*) the resistance increases (3)

(*iii*) resistance ≈ 1200 (Ω) (3)
(accept answer consistent with curve drawn; zero marks if no graph drawn)

(*iv*) any correct statement of Ohm's law *(in words or symbols)* (3)

current = 6 ÷ 1200 = 0.005 (A) (3)
(accept answer consistent with resistance value from part (iii) above)

(*v*) an LED requires less current // less energy lost as heat with an LED (3)