G.C.E. (O.L.) Support Seminar - 2014
Science - Paper I
Answer Guide

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3	4
4	1
5	3
6	2
7	1
8	2
9	4
10	2
11	1
12	3
13	1
14	2
15	2
16	4
17	3
18	1
19	3
20	2

Question No.	Answer
21	4
22	1
23	4
24	3
25	4
26	3
27	1
28	4
29	2
30	4
31	2
32	4
33	1
34	4
35	3
36	3
37	4
38	1
39	3
40	4

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Science - Paper II
Answer Guide

Part A – Structured Essay

1. (i) (*a*) To get water only when necessary (01 mark)
(*b*) wheel and axle (01 mark)

(ii) (*a*) primary treatment (01 mark)
(*b*) rusting and destruction/decay or a suitable answer (01 mark)

(iii) (*a*) eutrophication (01 mark)
(*b*) PO_4^{3-} / NO_3^- / NH_4^+ / NO_2^- or phosphate/nitrate/ammonium/nitrite (01 mark)
(*c*) greater than 1 (01 mark)

(iv) Presence of fishes feeding on mosquito larvae (01 mark)

(v) (*a*) √ (*b*) × (*c*) √ (03 marks)

(ii) (*a*) Potential Energy = $mgh = 8 \times 10 \times 5 = 400\,\text{J}$ (02 marks)
(*b*) (b) Kinetic energy = potential energy (according to the law of conservation of energy)

$$\frac{1}{2}mv^2 = 400$$
$$\frac{1}{\cancel{2}} \times \cancel{8}^{4} \times v^2 = 400$$
$$v^2 = \frac{400}{4}$$
$$v = 10\,\text{m s}^{-1}$$

(02 marks)

Total 15 marks

2. (*A*) (i) (*a*) paramecium (*b*) elephant/man
(*c*) human ovum/egg (*d*) amino acids
(*e*) human red blood cell/corpuscle (05 marks)

(ii) (ii) A suitable characteristic such as absence of a nucleus/presence of DNA or RNA as the genetic material/absence of organelles/reproduction being the only living characteristic
(01 mark)

(iii) AIDS (01 mark)

(iv) *X* - ova of the shoe flower
Y - white blood cell/corpuscle
Z - mitochondia (03 marks)

(*B*) (i) (*a*) maintaining balance of the body (01 mark)
(*b*) semi - circular canals (01 mark)

(ii) (*a*) Directing sound waves to the auditory canal
(*b*) Equating pressures in the outer and inner ear
(*c*) Transmitting auditory senses to the brain as a nervous impulse (03 marks)

Total 15 marks

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3. (*A*) (i) (*a*) electrons (*b*) neutrons (02 marks)

(ii) (*a*) *X* and *Y* (01 mark)

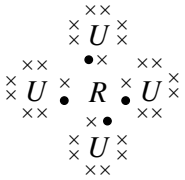
(*b*) In both the atomic number/proton number is equal (01 mark)

(*c*) Z_2Y - for finding valency (01)
for writing the correct formula (01) (02 marks)

(*B*) (i) (*a*) Group IV (01 mark)

(*b*) 1. diamond
2. graphite (01 marks)

(*c*) binding of carbon atoms by covalent bonds forming a giant atomic lattice. (02 marks)

(*d*) 

(01 mark)

(ii) (*a*) *P*

(*b*) *V*

(*c*) *Q* (03 marks)

(iii) *PT* (01 mark)

Total 15 marks

4. (*A*) (i) *x* - Distribution board / box (01 mark)

(ii) (*a*) fuse / miniature circuit breaker

(*b*) preventing the flow of a current greater than the permitted (02 marks)

(iii) marking N and L correctly (01 mark)

(iv) (*a*) Voltage

(*b*) Current (02 marks)

(v) a two - way switch (01 mark)

(vi) prevention of dangers by earthing a large amount of electrical charges in case of an electrical leakage. (01 mark)

(vii) lessening the thickness of wire / possibility of connecting an extra plug base easily. (01 mark)

(*B*) (i) *A* - dry cells / solar cells producing a direct current

B - dynamo / generator of electricity (02 marks)

(ii) *A* - direct current *B* - alternating current (02 marks)

(iii) *A* - lighting of one LED continuously

B - lighting of both LEDs / alternately (02 marks)

Total 15 marks

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Part B - Essay
Biology

5.(*A*) (i) *A* (01 mark)

(ii) presence of hair / sweat glands (01 mark)

(iii) (*a*) water (01 mark)

(*b*) exocrine glands (01 mark)

(iv) regulation of body temperature / sensory reception / acting as an excretory organ / protective function / synthesis of vitamin D. (01 mark)

(v) The blood capillaries are relaxed. So more blood is supplied to the skin. Hence more blood is lost. (02 marks)

(*B*) (i) Presence of teeth (01 mark)

(ii) starch (01 mark))

(iii) (*a*) pepsin (01 mark)

(*b*) pyloric sphincter (01 mark)

(iv) (*a*) Liver produces bile. Bile emulsifies fat. When liver is weak, this function is hindered. (02 marks)

(*b*) hepatic portal vein, hepatic vein ((02 marks)

(v) (*a*) *A* - network of capillaries

B - lacteal (02 marks)

(*b*) lymphatic system (01 mark)

(*c*) glycerol / fatty acids (01 mark)

(*d*) epithelial tissues (01 mark)

Total 20 marks

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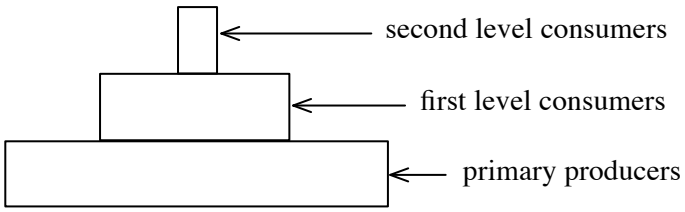
6.(*A*) (i) photosynthesis (01 mark)

(ii) $1000\not{g} \times \frac{1\not{0}}{10\not{0}} \longrightarrow 100\not{g} \times \frac{1\not{0}}{1\not{0}\not{0}} = 100\,J$ (01 mark)

(trophic level II) (trophic level III)

(iii)



(02 marks)

(iv) nitrate / NO_3^- / ammonium / NH_4^+ / nitrite /NO_2^- (ions) (01 mark)

(*B*) (i) *A* - seismonasty
B - phototropism (positive phototropism)
C - geotropism (negative geotropism) (03 marks)

(ii) *B* and *C* (02 marks)

(iii)
- Since the oxine concentration in the cells little below the apex of the shoot on the side opposite to the direction of light increases, those cells elongate.
- Therefore, the shoot turns towards light (02 marks)

(iv)
- Animal hormones are produced in special organs. In plants they are produced in cells in different parts.
- Animal hormones are transported by blood. plant hormones are transported in the xylem and phloem.
- Animal hormones are produced in one place and act either place. Plant hormones act either at the site of their production or elsewhere.

(01 mark)

(*C*) (i) Multiplication of the variety. (01 mark)

(ii) In asexual reproduction, offspring which are identical with parents are produced.
In sexual reproduction offspring different from parents are born. (01 mark)

(iii) During the production of ova and pollen. (02 marks)

(iv) (*a*) incomplete dominance (01 mark)

(*b*) parental generation (*P*) *Rr* × *Rr*

gametes *R* *r* *r* *R*

filial generation *RR* *Rr* *Rr* *rr*
Red Pink Pink White (02 marks)

Total 20 marks

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Chemistry

7. **(*A*)** (i) Activity I - To investigate the effect of the nature of the solute
Activity II - To investigate the effect of the nature of the solvent (02 marks)

(ii) *P* - NaCl / Sodium Chloride
Q - $CaCO_3$ / Calcium Carbonate
R - iodine / I_2 (01 mark)

(iii) increasing temperature (01 mark)

(iv) Maximum mass of the solute that can be dissolved in 100 g of the solvent at the given temperature. (01 mark)

(v) $\frac{8.5\,g}{2} = 4.25\,g$ (02 marks)

(vi) (*a*) No. of moles $= \frac{\text{mass}}{\text{molar mass}}$

$= \frac{5.85}{58.5}$

$= 0.1\,mol$ (01 mark)

(*b*) $C = \frac{n}{v}$

$= \frac{0.1}{250/1000}$

$= 0.4\,mol\,dm^{-3}$ (01 mark)

(*c*) 1. Weighing the mass of the solute using a watch glass and a triple - beam balance.
2. Transferring the weighed mass of the solute to a volumetric flask through a funnel using the wash bottle.
3. Mixing the solution.
4. Making the solution up to the mark adding the last few drops of water with a dropping pipette.

(02 marks)

(*B*) (i) (*a*) S (Sulpher) (01 mark)

(*b*) acid rains (01 mark)

(*c*) iron ore, coke, limestone (01 mark)

(ii) $X < Y < Z$ (01 mark)

(iii) (*a*) *P* - carbon / coke / C / coal
Q - Fe_2O_3 (01 mark)

(*b*) $Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$ (02 marks)

(iv) (*a*) CO_2 / Carbon dioxide
(*b*) maintenance of the Earth's temperature through the green house effect. (02 marks)

Total 20 marks

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8. **(*A*)** (i) Fe / Cr / Cd / Co / Ni (01 mark)

(ii) (*a*) Sodium metal reacts with water in the solution (01 mark)

(*b*) 1. $CuSO_4 + Mg \longrightarrow MgSO_4 + Cu$ (01 mark)

2. Decrease in the intensity of blue colour in the solution
Precipitation of a brown / reddish brown solid / powder
Evolution of heat / rise in temperature
Evolution of gas bubbles
(any two) (02 marks)

3. No (01 mark)

In both instances the amount of moles of magnesium is the same.
So, excess amount of copper sulphate does not change the amount of the product. (02 marks)

(*c*) Silver is less reactive than copper / Silver is placed below copper in the activity series. (01 mark)

(iii)
- Finding methods to protect metals from corrosion.
- Selection of metals for electrochemical cells.
- Deciding on methods suitable to extract metals. (01 mark)

(*B*) (i) (*a*) O_2 / Oxygen (01 mark)

(*b*) relights a glowing splint (01 mark)

(ii) $2H^+ + 2e \longrightarrow H_2$ (01 mark)

(iii) Decreases (01 mark)

(iv) a brown / reddish brown / pink solid substance is deposited (01 mark)

(v) Cathode - $Cu^{2+} + 2e \longrightarrow Cu$ (02 marks)

(vi) *R* (01 mark)

(vii) Does not change (01 mark)

(viii) *R* (01 mark)

Total 20 marks

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Physics

9.(*A*) (i) $a = \frac{20}{10} = \underline{\underline{2\,\text{ms}^{-2}}}$ (01 mark)

(ii) (*a*) $F = m\,a$
$= 10 \times 2$
$= \underline{\underline{20\,\text{N}}}$ (02 marks)

(*b*) Distance travelled $= \frac{1}{2} \times 20 \times 10$
$= 100\,\text{m}$ (01 mark)

(iii) (*a*) 12 N (01 mark)

(*b*) Though a force is applied, no acceleration made, so the entire force is used to overcome friction. (01 mark)

(iv) (*a*) velocity decreases / retarded (01 mark)

(*b*) because $a \propto \frac{1}{m}$ / because acceleration decreases when the mass increases. (02 marks)

(*c*) Newton's second law of motion. (01 mark)

(*B*) (i) When it touches *B* a higher current flows; when it touches *C* the current decreases. (02 marks)

(ii) $V = I\,R$
$6\,\text{V} = 1.5\,\text{A} \times R$
$\frac{6\,\text{V}}{1.5\,\text{A}} = R$
$\underline{\underline{4\,\Omega = R}}$ (02 marks)

(iii) Applying $R = \rho \frac{l}{A}$
for I,
$4 = \rho \frac{l}{A}$
$\rho = \frac{4A}{l}$

Applying same for II,

$R = \rho \frac{l}{A}$
$R\,A = \rho\,l$
$R \times 2\cancel{A} = \frac{2\cancel{A}A}{\cancel{l}} \times \frac{\cancel{l}}{\cancel{2}}$
$\underline{\underline{R = 1\,\Omega}}$ (02 marks)

(*C*) (i) Rainbow (01 mark)

(ii) (*a*) ${}_a\text{n}_\text{w} = \frac{\sin i}{\sin r}$
${}_a\text{n}_\text{w} = \frac{\sin 41.8^\circ}{\sin 30^\circ}$
${}_a\text{n}_\text{w} = \frac{0.6667}{0.5000}$
$\underline{\underline{{}_a\text{n}_\text{w} = 1.33}}$ (02 marks)

(*b*) The ratio of the Sin of the angle of incidence to the Sin of the angle of refraction is a constant. (01 mark)

Total 20 marks

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10.(*A*) (i) *A* (01 mark)

(ii) Pessure $= \frac{\text{Force}}{\text{Area}}$

$= \frac{100\,\text{N}}{1\,\text{m}^2}$ } (01 mark)

$= 100\,\text{N m}^2$ (01 mark))

(iii) instances where the pressure is increased (eg. shapning of a knife...) (01 mark)

instances where the pressure is decreased (eg. using a plank when walking on muddy surface...) (01 mark)

(*B*) (i) $P = h\rho g$

$= \frac{50}{100}\,\text{m} \times 1000\,\text{kg m}^{-3} \times 10\,\text{m s}^{-2}$ } (01 mark)

$= 5000\,\text{Pa}$ (01 mark)

(ii) When decending in a water body the height of the water coloumn increases leading an increase in pressure. Therefore, to withstand the pressure the base is made broader. (02 marks)

(*C*) (i) *y* (01 mark)

(ii) The quantity of heat required to increase the temperature of 1 kg of *x* by 1K is 4200 J. (02 marks)

(iii) $Q = mc\theta$

$= \frac{50}{1000} \times 4200 \times 20$

$= 4200\,\text{J}$ (02 marks)

(iv) Because the boiling point of alcohol is below 80°C. (01 mark)

(*D*) (i) Decreases the force *P* (01 mark)

(ii) $900 \times 0.5 = 5 \times P$

$\frac{900 \times 0.5}{5} = P$

$90\,\text{N} = P$ (02 marks)

(iii) Friction at the pivot (01 mark)

(iv) Decreasing the weight suspended. / Shifting pivoting point towards A. (01 mark)

Total 20 marks