

Student's Name:.....

TABLE OF CONTENTS

SUBJECT	PAGE
GENERAL PAPAER.....	02
BIOLOGY.....	09
AGRICALTURE.....	13
CHEMISTRY.....	17
MATHMATICS.....	25

S5 GENERAL PAPER

Answer one question from this section

1. Study the information given below very carefully and answer the questions that follow.

You are the Managing Director of a small but long – established firm that specializes in the manufacture of high quality furniture for export.

As a result of the global recession and a sharp fall in orders, you had to cut back on overheads such as training, sponsorship and advertising. As a further economy measure, you now have to decide on which member of your senior management team should leave the firm. (Apart from their own particular responsibilities, this senior management team advises the managing director on the overall running of the business)>

Below are the notes you have made on your three colleagues.

A. Felix Momsenta

1. He plays too much golf
2. Much loved by the welfare
3. Two children in the armed forces
4. Great grandson of the original founders of the firm
5. In the past, he has invested heavily in the company

6. Hopeless with figures
7. Family still owns the site on which our factory stands.
8. Can't stand paperwork or long business meetings
9. Lost a fortune in the recent financial melt down
10. Nice manners can always be trusted with foreign visitors

B. Henry Ordoma

1. Must be nearly 60
2. Who else could put the finishing touches to our products
3. He's never complained when we've had to freeze everyone's salary in the past.
4. Tends to come into work only when it suits him.
5. His mind goes blank as soon as we suggest anything new.
6. Without him, that strike would have gone on for weeks
7. He devotes much of his spare time to serving charities
8. His family members have been skilled craftsmen here for generations
9. He's too much fond of gossip.
10. He often shows a great deal of commonsense.

C. Grace Nautienne

1. It was her flair for publicity that gained us worldwide fame

2. Almost always exceeds her budget
3. I do like the biscuits she brings for our meetings
4. She's my wife's best friend
5. Puts in long hours every day.
6. She will make the odd unfortunate remark that everyone hears
7. She has often applied for "more rewarding" positions elsewhere
8. Her husband's the Minister for overseas trade.
9. Can be very busy. Won't take no for an answer
10. A pity I've had to turn down so many of her "brilliant" ideas

Questions

- (a) As a Managing Director, which member of the senior management team would you be most inclined to ask to leave? Select five evidences from the passage.
- (b) As a Managing Director, which member of the senior management team would you be least inclined to ask to leave? Select five evidence from the passage.
- (c) Out of ten comments recorded above for each, in your opinion, which has the least relevance to the decision that has to be taken for:
 - (i) Felix (choose one)
 - (ii) Grace (choose one)

- (iii) Henry (choose one)
- (d) Give the effects of the economic recession in your country.

2. Read the passage below and answer the questions which follow.

It still remains to speak of one of the principal causes which make diversity of opinion advantageous, and will continue to do so until mankind shall have entered a stage of intellectual advancement which at present seems at an incalculable distance. We have hitherto considered only two possibilities: that the received opinion may be false, and some other opinion, consequently true: or that the received opinion being true, a conflict with the opposite error is essential to a clear apprehension and deep feeling of its truth. But there is a commoner case than either of these; when the conflicting doctrines, instead of being one true and the other false, share the truth between them, and the nonconforming opinion is needed to supply the remainder of the truth, of which the received doctrine embodies only a part. Popular opinions, on subjects not **palpable** to sense, are often true, but seldom or never the whole truth. They are a part of the truth; but seldom or never the whole truth. They are a part of the truth; sometimes a greater, sometimes a smaller

part, but exaggerated, distorted, and disjointed from the truths by which they ought to be accompanied and limited. Heretical opinions, on the other hand, are generally some of these suppressed and neglected truths, bursting the bonds which kept them down, and either seeking reconciliation with the truth contained in the common opinion, or fronting it as enemies, and setting themselves up, with similar **exclusiveness**, as the whole truth. The latter case is hitherto the most frequent, as in the human mind, one-sidedness has always been the rule, and many sidedness the exception. Hence, even in revolutions of opinion, one part of the truth usually sets while another rises.

Even progress, which ought to **superadd**, for the most part only substitutes, one partial and incomplete truth for another; improvement consisting chiefly in this, that the new fragment of truth is usually more wanted, more adapted to the needs of the time, than that which it displaces.

Thus, in the eighteenth century, when nearly **all the instructed, and all those of the uninstructed** who were led by them, were lost in admiration of what is called civilization, and of the **marvels** of modern science, literature, and philosophy, and while greatly over-rating the amount of **unlikeness** between the men of modern and those of ancient times, **indulged the belief that the whole of the**

difference was in their own favour; with what a salutary shock did the paradoxes of Rousseau explode like bombshells in the midst, **dislocating the compact mass** of one-side opinion, and forcing its elements to recombine in a better form and with **additional ingredients.** Not that the current opinions were nearer to it; they contained more of positive truth, and very much less of error. Nevertheless there lay in Rousseau's doctrine, and has floated down the stream of opinion wanted; and these are the deposit which was left behind when the **flood sub-sided.** The superior worth of simplicity of life, the enervating and demoralizing effect of the trammels and hypocrises of artificial society, are ideas which have never been entirely absent from **cultivated minds** since Rousseau wrote; and they will in time produce their due effect, though at present needing to be asserted as much as ever, and to be asserted by deeds, for words, on this subject, have nearly exhausted their power.

- (a) Suggest a suitable title for passage
- (b) What does the author mean by:
 - (i) “all the instructed and those of the uninstructed
 - (ii) “Indulged in the belief that the whole of the difference was in their favour.....”

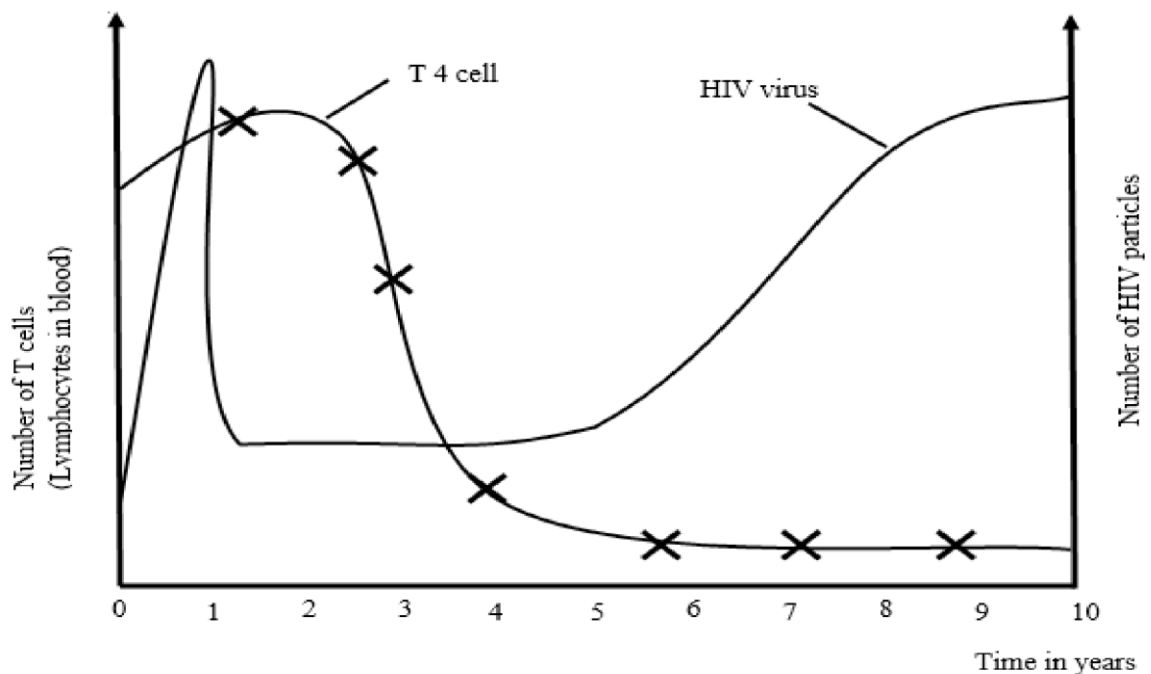
- (c) In not more than 100 words, summarize the reasons why diversity of opinion is necessary (12marks)
- (d) Explain the meaning of the following words and phrases as used in the passage, using your own whenever possible
- (i) Palpable
 - (ii) Exclusiveness
 - (iii) Superadd
 - (iv) Instructed
 - (v) Marvels
 - (vi) Indulged
 - (vii)
 - (viii) Dislocating the
 - (ix) compact mass
 - (x) Additional ingredients
 - (xi) Flood subsided
 - (xii) Cultivated minds

END

BIOLOGY
ATTEMPT ALL QUESTIONS

1. A study was conducted on the effect of development of an infection with human immune deficiency virus (HIV) on the number of type of T4 lymphocytes (T - lymphocytes).

The results are presented in the figure 1 below. study the figure and answer the questions that follow.

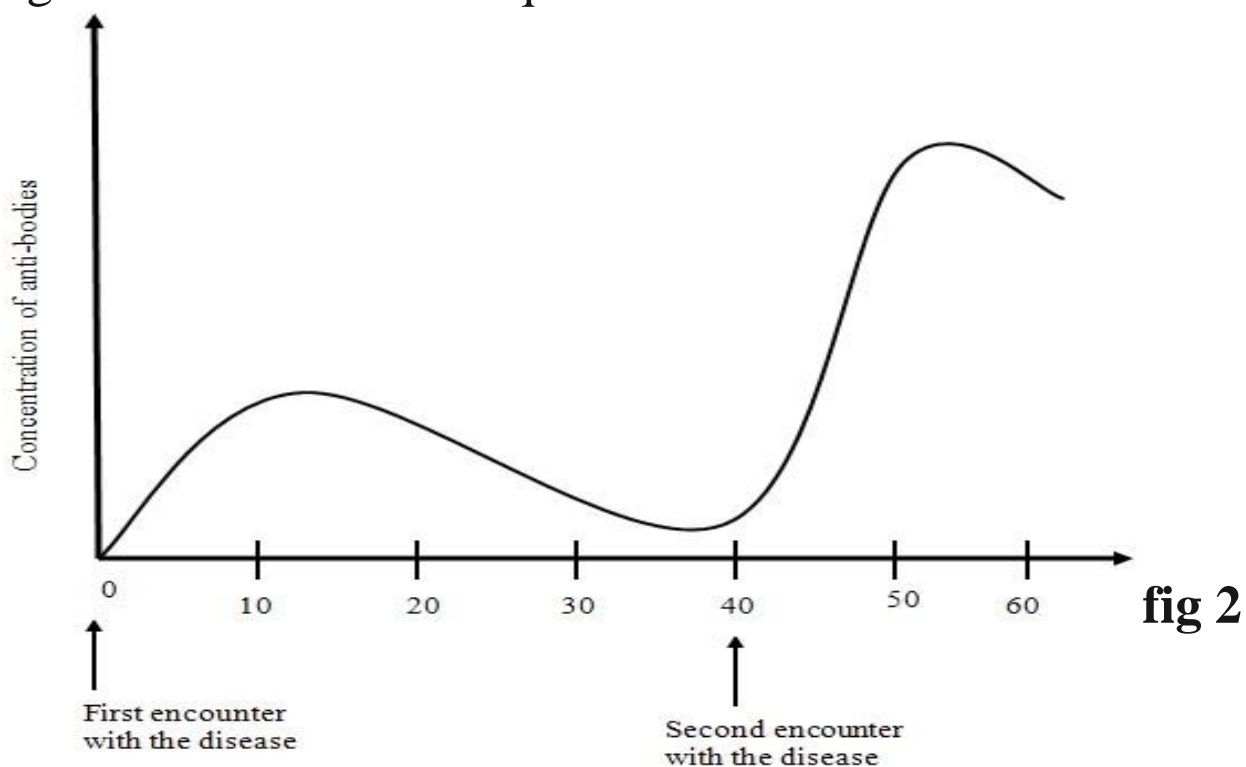


- (a) Describe the effect of HIV infection on the variation of numbers of T4 cells in blood for the period of 10 years.
(06 marks)
- (b) Explain.
- (i) The relationship between the number of HIV particles and number of T4 cells in blood over the 10 years. (12 marks)

(ii) The role played by T- Lymphocytes in the immune response.

c) Suggest important area of treatment that medical researchers must consider in order to prevent spread of HIV infection. (3marks).

1.2 In another experiment, the quantities of antibodies produced in the first infection and second infection by the same disease was studied and the results are shown in figure 2 below. Study the figure 2 and answer the questions that follow.



(d) Explain the difference in the changes and peaks in the concentrations of the antibodies in the first and second encounters with the disease. (9marks)

- (e) Explain how the changes in the concentration of the antibodies under the two conditions exhibited in the figure 2 can be made in providing immunity artificially to human .
- (4marks)

SECTION B (60 MARKS)

2. (a) Suggest the advantages of being;

- (i) Unicellular (4marks)
- (ii) Multicellular

How have multicellular organisms overcome the challenge they face (8marks)

- (b) Using cubes of different sizes of animals; illustrate mathematically that; as an animal increases in size; its surface area to volume ratio decreases. (4marks)

3. (a) Describe methods of transport of each of the following substances between various regions;

- (i) Mineral salts from soil into xylem vessel.
- (6marks)

(ii) Sugars across a sieve plate.

(4marks)

(iii) (b) Explain how changes in PH plays role in transport of carbon dioxide in mammals 10(marks)

4. (a) State the types of muscles and where such muscles are located. (3marks)

5. (b) Briefly describe the characteristics of a skeletal muscle. (7marks)

c) Explain the process of muscle contraction using the sliding filament hypothesis. (10marks)

d)(a) Describe each of the following biotic interactions in an ecosystem:

(i) predation (3marks)

(ii) Symbiosis (3marks)

Explain adaptations of predators to capture their preys in an ecosystem. (14marks)

e)(a) Describe the following reproductive activities that occur in an algae

(i) asexual reproduction. (4 marks)

(ii) sexual reproduction. (6marks)

(b) Compare the process of gametogenesis in male and female plants. (10marks)

END

AGRICULTURE S.5

Instructions to candidates: Attempt all SECTION A (20 MARKS)

1. The table below shows the relationship between environmental temperature and daily intake of feeds by layers per unit of metabolic body weight. Use the table to answer the questions that follow.

Daily feed intake (kg/net wt.)	250	220	180	150	130	100
Environmental temperature ($^{\circ}\text{C}$)	10	20	27	30	35	37

- (a) Plot a suitable graph to represent the data in the table. **(8 marks)**

- (b) (i) How does environmental temperature affect the daily feed intake in layers? **(1 mark)**

Suggest the explanation for the effect of environmental temperature on the daily feed intake in layers. **(2 marks)**

- (c) From the graph, what would be the consequences of high environmental temperature on the performance of layers? **(3 marks)**

- (d) Layers are Homiotherms, what is the benefit of such characteristic? **(3 marks)**
- (e) As Homiotherms, how do layers react to overheating? **(3 marks)**

SECTION B (20 MARKS)
CROP SCIENCE

2. (a) Give the meaning of the following terms as applied to agriculture principles.
- (i) Grafting
 - (ii) Volatilization
 - (iii) Seed dormancy **(6 marks)**
- (b) Describe three methods of breaking seed dormancy. **(6 marks)**
- (c) Outline the benefits of practicing grafting in fruit production. **(8 marks)**
3. (a) Describe the factors affecting the choice of an irrigation mode by the farmer. **(10 marks)**
- (b) Give the limitations of flood irrigations over other methods in farming. **(6 marks)**
- (c) List down the components of a sprinkler system. **(4 marks)**

SECTION C (20 MARKS) ANIMAL SCIENCE

4. (a) Explain the factors considered by farmers while siting for an apiary. **(10 marks)**
- (b) Give the precautions that should be taken when harvesting honey. **(6 marks)**
- (c) State the four major tools used in honey harvesting from bees. **(4 marks)**
5. (a) Describe the causes of damages on hides before drying. **(10 marks)**
- (b) Suggest the precautions to be taken for good hides production for sale. **(10 marks)**

SECTION D (20 MARKS) AGRICULTURAL ENGINEERING

6. (a) Describe the benefits of fencing land in agricultural production. **(10 marks)**
- (b) What are the guidelines of putting up a barbed wire fence? **(10 marks)**
7. (a) Give the role of a good storage facility in minimizing crop losses at the farm. **(10 marks)**
- (b) By giving a function in each case, state the components of a modern roof structure. **(10 marks)**

SECTION E (20 MARKS)
AGRICULTURAL ECONOMICS

8. (a) State the role of population size in agriculture production in Uganda. **(10 marks)**
- (b) Mention the causes of drought in some parts of Uganda. **(10 marks)**
9. (a) Describe the benefits of co-operatives in agriculture sector in Uganda. **(10 marks)**
- (b) Explain the principles of operation of co-operatives societies .

END

CHEMISTRY S5

Instructions to candidates:

Attempt *ALL* Questions from this section.

1. (a) State Raoult's law of vapor pressure lowering. (1 mark)
- (b) The table below gives the partial vapour pressure for the two component mixtures of propane and trichloromethane at 35°C for a range of mole fractions of trichloromethane.

Mole fraction of CHCl ₃	0.0	0.2	0.4	0.6	0.8	1.0
Partial pressure of CHCl ₃ (mmHg)	0	35	82	142	219	293
Partial pressure of CH ₃ COCH ₃ (mmHg)	347	270	185	102	37	0

3 3

- (i) Plot a suitable graph to show that this system deviates from Raoult's law. (5 marks)
- (ii) Name the type of deviation shown by the system. (1½marks)
- (iii) State the cause of such a system showing this deviation and the characteristics of such a system showing this deviation. (3½ marks)

- (c) What are the requirements for a system to obey Raoult's law.
- (d) Methanoic acid and water are miscible in all proportions. They form a maximum boiling point mixture containing 77.5% of methanoic acid which boils at 108°C . the boiling point of methanoic acid is 101°C
- (i) Sketch a labeled diagram of the mixture of methanoic acid and water showing the variation of boiling point with composition. (3 marks)
- (ii) Describe briefly what happens when a mixture containing 40% methanoic acid is distilled. (3 marks)
- (iii) Suggest one method by which methanoic acid may be obtained from the mixture. (1 mark)
- (iv) Explain what happens if a mixture of 77.5% methanoic acid is heated. (2 marks)

2. For each of the following complex ions:

Determine the:

(i) oxidation number

(ii) coordination number

$[\text{Ni}(\text{NH}_3)_6]^{2+}$ and $[\text{Fe}(\text{CN})_6]^{4-}$ (2 marks)

(b) The stability constant for the $[\text{Cu}(\text{Cl}_4)]^{2-}$ is 1.4×10^{13}

- (i) What is meant by stability constant. (2 marks)
- (ii) Explain what happens if excess aqueous ammonia was added to a solution of $[\text{Cu}(\text{Cl}_4)]^{2-}$ (2 marks)
- (iii) Which of these two complexes is more stable?
 $[\text{Co}(\text{NH}_3)_6]^{3+}$ and $[\text{Co}(\text{NH}_3)_6]^{2+}$
 Give a reason for your answer. (1½ marks)
- (c) (i) How would you test for $\text{Cr}^{3+}(\text{aq})$ ions (1½ marks)
- (ii) Name a reagent and give the observation of how you would distinguish between chromium
 (iii) sulphate and copper
 (ii) sulphate solution (1½ marks)
- (iii) When sodium carbonate solution is added to chromium
 (iv) sulphate solution, a green precipitate and a colourless gas is observed. Explain (2 marks)
- (d) A hydrated compound contains copper(ii) ions ammonium ions and chloride ions. 27.75g of the compound was dissolved in water and made up to 1 litre of solution with distilled water. 25cm³ of this solution was boiled with excess sodium hydroxide solution and liberated ammonia reacted completely with 25cm³ of 0.2M hydrochloric acid. Another 25cm³ of the solution reacted with silver nitrate solution and 1.435g of silver

chloride was precipitated. A third 25cm^3 portion on treatment with excess potassium iodide reacted with 12.5cm^3 of 0.2M sodium thiosulphate solution. Determine the molecular formula of the compound. (6 marks)

3. (a) Using equations only, show how the following compounds can be synthesized.

(i) Phenylethanoate from amino benzene (4 marks)

(ii) 1,3,5-tribromobenzene from benzene diazonium chloride. ($3\frac{1}{2}$ marks)

(iii) 2,2-dichloropropane from propan-1-ol ($2\frac{1}{2}$ marks)

(b) 28cm^3 of a gas containing a mixture of nitrogen, methane and hydrogen was exploded with 54cm^3 of oxygen. The residual gas measured 46cm^3 . After the addition of potassium hydroxide solution, the volume further reduced to 32cm^3 . All measurements were made at room temperature and pressure. Calculate the volume of each gas present in the original mixture. (10 marks)

4. (a) Define the term isotopes (1 mark)

(b) One of the factors that affect the stability of the isotopes is neutron to proton ratio

- (i) State the other factor (1 mark)
- (ii) State a graph of number of neutrons versus number of protons and on it indicate:
- The line in which $n/p=1$
 - The stability region
 - Three points in the instability region (3½ marks)
- (c) Describe briefly how the isotopes in the instability region in the three points indicated in (b) (ii) above can gain stability.(4 marks)
- (d) Gallium has two isotopes of mass numbers 69 and 71 in the ratio X:Y. If the relative atomic mass of gallium is 69.8, determine the values of X and Y
- (e) The table below shows the results of the radioactive

decay of $^{234}_{91}\text{Pa}$

Time (seconds)	20	40	60	80	100	120
Mass of $^{234}_{91}\text{Pa}$ (g)	48.2	38.5	31.5	26.0	21.0	17.2

Plot a graph of $\log(\text{mass})$ against time and use it to determine the:

- initial $^{234}_{91}\text{Pa}$ mass of (1mark)
- decay $^{234}_{91}\text{Pa}$ constant of Pa (2marks)
- half life of (2 marks)

SECTION B

Attempt any **two** questions from this section.

5. (a) (i) Outline the chemical processes involved in the manufacture of nitric acid.
- (ii) State two large scale uses of nitric acid.
- (b) Concentrated nitric acid is 70% (w/w) and has a density of 1.42gcm^{-3} . Calculate the morality of concentrated nitric acid.
- (c) 12.68cm^3 of acid in (b) was dissolved in water and solution made up to 250cm^3 with distilled water calculate the volume that would react completely with 25.0cm^3 of $0.2\text{M Na}_2\text{CO}_3$.
- (d) (i) Briefly discuss the reaction between copper and nitric acid. Illustrate your answers with equations.
- (ii) Discuss the reaction of nitric acid in organic synthesis.
6. (a) (i) Explain what is meant by the term buffer solution.
- (ii) State one application of a buffer solution.
- (b) 0.01M HCl was added to 1litre of a solution containing $1\text{M CH}_3\text{COOH}$ AND $1\text{M CH}_3\text{COONa}$. Calculate the PH of the resultant solution.
- (K_a for $\text{CH}_3\text{COOH} = 1.8 \times 10^{-5} \text{ mol dm}^{-3}$)
- (c) (i) What is meant by an acid base indicator
- (ii) Describe how phenolphthalein works as an indicator.

(d). Sodium hydroxide solution was added to 25cm³ of 0.1M CH₃COOH and PH of the resultant solution was measured at intervals.

Volume of NAOH(cm ³)	0	4	8	12	16	20	22	22.5	23	24	28
PH of mixture	2.8	3.5	4	4.5	5.1	5.8	7	9	10.5	11.4	12.3

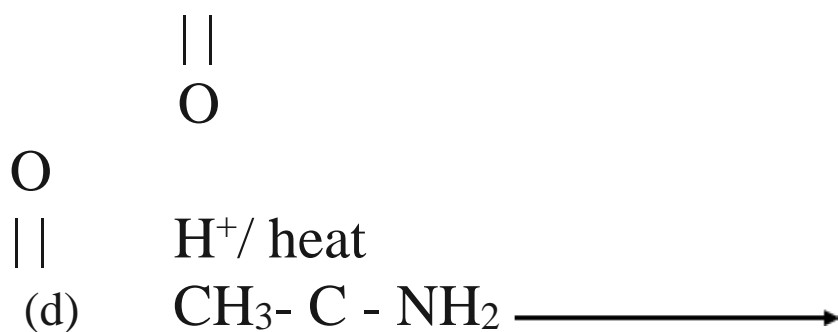
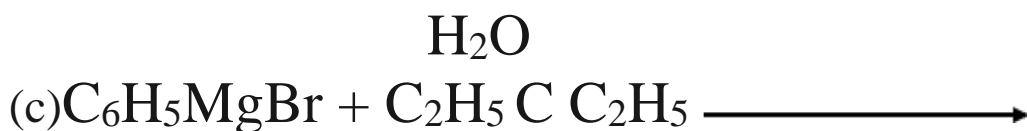
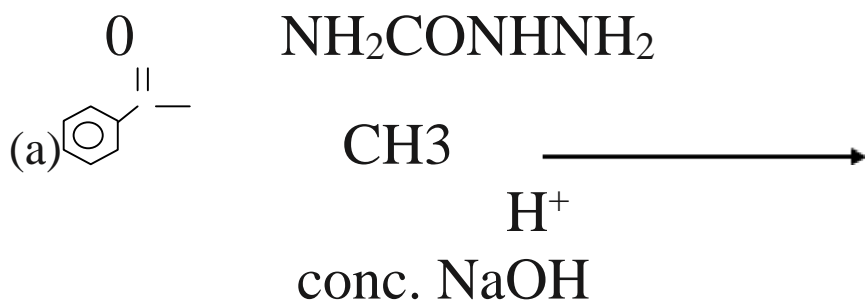
- (i) Plot a graph of PH against volume of sodium hydroxide
- (ii) Explain the shape of the curve.
- (iii) Determine the PH at the end point.
- (iv) Calculate the morality of sodium hydroxide solution.
- (v) Determine the dissociation constant, K_a of ethanoic acid used.

7. Explain the following observations

- (a) When aqueous sodium carbonate was added to aqueous aluminium chloride solution, a white precipitate was formed and a colorless gas evolved.(4marks)
- (b) Group(II) salts are generally less soluble in water than corresponding salts of group(I) elements.
- (c) When lead(IV) oxide is heated with Sulphur dioxide, a white solid is formed. (4 marks)
- (d) Chloric (I) acid, HClO₁ is weaker than Chloric(V) acid HClO₃ (4 marks)

(e) The melting point of aluminium oxide is less than that of calcium oxide (4 marks)

8. Complete the following equations and suggest a possible mechanism for each reaction.



S.5 MATHS

INSTRUCTIONS:

- Attempt all question

1. Find x if $\log_{\frac{8}{x}} - \log_{\frac{16}{x^2}} = 1$.

2. Solve the equation $\log_2 x - \log_x 8 = 2$.

3. Simplify $\frac{\sqrt{3}-2}{2\sqrt{3}+3}$ in the form $p+q\sqrt{3}$ where p, q are rational numbers.

4. Solve for x in the equation $\log_4(6-x) = \log_2 x$.

5. Find $\frac{dy}{dx}$ if $y = \frac{(x+1)^2(x+2)}{(x+3)^3}$ giving your answer in the simplest form.

6. Differentiate the following with respect to x ;

(i) $(x+1)^{\frac{1}{2}}(x+2)^2$

(ii) $\frac{2x^2+3x}{(x-4)^2}$

(iii) $\frac{(x+1)^2}{(x+4)^4}$

(iv) $\frac{\sqrt{x^2+1}}{(2x-1)^2}$

(v) $\frac{x^2 e^x}{(x-1)^3}$

(vi) $y = \sqrt{(6+x)} \sqrt{(3-2x)}$

$$(vii) \ y = 7x^2 \sqrt{(x^2 - 1)}$$

$$(viii) \ y = \frac{1}{x^2 - 3x + 5}$$

$$(ix) \ y = (1 - 3x^2)^5$$

(5marks)

7. Express as equivalent fraction with a rational denominator

$$\frac{\sqrt{2}}{\sqrt{2} + \sqrt{3} - \sqrt{5}}$$

8. (a) If $\log_{a^b} = \frac{1}{\log_{ba}}$

(b) Solve (i) $\log_n 7 + \log_{4n^2} = 3$.

(ii) $2^{2x-1} + \frac{3}{2} = 2^{x+1}$

c) Prove that $\log_6 x = \frac{\log_3 x}{1 + \log_3 2}$ hence given that

$\log_3 2 = 0.631$, find without using table or calculator $\log_6 4$ correct to 3 significant figures.

S.5 MATHEMATICS P.2

INSTRUCTIONS: *Answer all questions*

SECTION A

1. A class performed an experiment to estimate the diameter of a circular object. A sample of five students had the following results in centimeters, 3.13, 3.16, 2.94, 3.33 and 3.0

Determine the sample;

- (a) Mean
- (b) Standard deviation

2. Events A and B are such that $P(A \cap B) = \frac{1}{2}$ and

$$P(A/B) = \frac{1}{3} \text{ find } P(B \cap A^c)$$

3. A vehicle of mass 2.5 metric tonnes is drawn up on a slope of 1 in 10 from rest with an acceleration of 1.2 ms^{-2} against a constant frictional resistance of $\frac{1}{100}$ of the weight of the vehicle, using a cable. Find the tension in the cable.

4. Given that A and b are mutually exclusive events and

$$P(A) = \frac{2}{3} \text{ and } P(B) = \frac{1}{2} \text{ find;}$$

(i) $P(A \cup B)$, (ii) $P(A \cap B^1)$ (iii) $(A^1 \cap B^1)$

5. Four forces $ai + (a - 1)j$, $3i + 2aj$, $5i - 6j$ and $-i - 2j$ act on a particle. The resultant force makes an angle of 45° with the horizontal. Find the value of a , Hence determine the magnitude of the resultant force.

6. If A and B are independent events;

(i) Show that the events A and A^1 are also independent

(ii) Find the $P(B)$ given that $P(A) = 0.4$ and $P(A \cup B) = 0.8$.

SECTION B (DO THREE NUMBERS)

7. The table below shows the amount of money (in thousands of shillings) that was paid out as an allowance to participants during a certain workshop.

Amount (sh'000s)	No of participants
110-114	13
115-119	20
120-129	32
130-134	17
135-144	16
145-159	12

(a) Draw a histogram and use it to estimate the modal allowance.

(b) Calculate; (i) median allowance (ii) mean allowance

8. Below are marks scored by 8 students A, B, C, D, E, F, G and H in mathematics, Economics and Geography in the end of term examinations.

	A	B	C	D	E	F	G	H
MATHS	52	75	41	60	81	31	65	52
ECON	50	60	35	65	66	45	69	48
GEOG	35	40	60	54	63	40	55	72

Calculate the Rank correlation coefficients between the performance of the students in,

(i) Mathematics and Economics

(ii) Geography and Mathematics

Comment on the significance of maths in the performance of Economics and Geography.

(spearman, = 0.86, Kendall's, $\tau_b = 0.79$ based on 8 observations at 1% level of significance)

9. Six forces, 9N, 5N, 7N, 3N, 1N and 4N act along the sides of PQ, QR, RS, ST, TU and UP of a regular hexagon of side 2m, their direction being indicated by

the order of letters. Taking PQ as the reference axis, express each of the forces in vector form, hence find the;

- (i) Magnitude and directions of the resultant of the forces
- (ii) Distance from P where the line of action of the resultant cuts PQ.

10. A block of mass 6.5kg is projected with a velocity of 4ms^{-1} up a line of greatest slope of a rough plane. Calculate the initial kinetic energy of the block. The coefficient of friction between the block and the plane is $\frac{2}{3}$ and the plane makes an angle θ with the horizontal where $\sin \theta = \frac{5}{13}$. The block travels a distance $d\text{m}$ up the plane before coming instantaneously to rest. Express in terms of d .

- (i) The potential energy gained by the block in coming to rest.
- (ii) The work done against friction by the block in coming to rest. Hence calculate the value of d . (take $g=10\text{ms}^{-1}$).

11. A mass of 3kg is at rest, on a smooth horizontal table. It is attached by a light inextensible string passing over a smooth fixed pulley at the edge of the table to another mass of 2kg, which is hanging freely. The system is released from rest. Determine the resulting acceleration and the tension in the string.

END