RESUMÉ OF CHIEF EXAMINERS' REPORTS WASSCE MAY/JUNE 2015

TECHNICAL SUBJECTS

1. **GENERAL COMMENTS**

The Chief Examiners of all the technical subjects indicated that the standard of the papers at the examination were similar to those of previous years.

The performance of candidates on the whole ranged from encouraging as in Technical Drawing 3, Metalwork 3, ICT 2 and 3 and Applied Electricity 3 to average performance in Woodwork 2, Electronics 3 and Auto Mechanics 3 to poor performance in Technical Drawing 2, Metalwork 2, Applied Electricity 2 and Auto Mechanics 2.

2. **A SUMMARY OF CANDIDATES' STRENGTHS**

(1) INDEPTH KNOWLEDGE OF SUBJECT MATTER

The Chief Examiners' Reports showed all the subjects handled by the section had a few candidates giving very impressive answers to some of the questions.

Candidates exhibited this knowledge in Technical Drawing 2 by copying the given views with outlines clearly differentiated from the constructed. In Auto Mechanics 2, candidates gave impressive responses and in ICT 2, candidates showed delve knowledge in the impact of Information Technology in everyday life.

(2) ORDERLY PRESENTATION OF ANSWERS

The Chief Examiners reported that a few candidates responded to the questions as demanded by the rubrics and presented their work in very clear and logical manner. These comments were expressed in Metalwork 2, ICT 2 and 3 and Electronics 3.

(3) GOOD INTERPRETATION OF DRAWINGS

Candidates showed improved ability to interpreting detailed drawings in Metalwork 3. In Technical Drawing 3 the Chief Examiner noted that the draughtsmanship skills of the candidates was very good.

3. **A SUMMARY OF CANDIDATES' WEAKNESSES**

(1) LACK OF ADEQUATE PREPARATION

Many Candidates were said to have shown from their responses that they did not prepare adequately for the examination. This was shown in their failure in applying the right marking out lines on metals before cutting, inability to appreciate the key requirement of the questions as exhibited in ICT 2 and candidates using Microsoft word for the database application in ICT 3.

(2) LACK OF INDEPTH KNOWLEDGE OF SUBJECT MATTER

Some students according to the chief examiners demonstrated in their answers that they had little or no knowledge of the examination syllabus.

This state of affairs were demonstrated in ICT 2, and in Metalwork 3, majority of the candidates failed to choose the test requiring machining operation on the lathe. In Technical Drawing 2 it has been reported that candidates scale conversion was poor and in Technical Drawing 3, candidates had problems with types of lines and where they are used.

(3) POOR COMMUNICATION SKILLS

Expression of ideas into written form was one major problem. These sentiments were expressed by chief examiners of Auto Mechanics 2, ICT 2 and Applied Electricity 2.

Candidates could not interpret meter readings in Electronics 3 and in Electricity 3

Candidates could not draw good graphs nor find slopes. Metalwork 2 and Auto Mechanics 2 and Woodwork 2 report showed candidates had poor sketching skills.

4. **SUGGESTED REMEDIES FOR THE WEAKNESSES**

(1) Teachers should give more exercises involving sketching to improve candidates' skills in sketching.
(2) Teachers should cultivate logical reasoning skills in candidates to help in the development of programming skills.
(3) Teachers should prepare candidates on the techniques of answering examination questions.
(4) Candidates should make conscious effort to improve their written skills in English Language.

APPLIED ELECTRICITY 2

1. **GENERAL COMMENTS**

Though the standard of the paper has almost remained the same, yet the overall performance of candidates this year was poor.

2. A SUMMARY OF CANDIDATES' STRENGTHS

(1) There has been an improvement in indicating electrical units to some quantities.
(2) Candidates solved the questions using the correct formulae.
(3) Most of the candidates responded to problems involving electrical installation and maintenance.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

(1) Most candidates could not solve problems involving the electronic section of the syllabus.
(2) Majority of the candidates could not sketch the magnetic field pattern demanded by the rubrics.
(3) Candidates could not give the correct units of electrical quantities.

4. SUGGESTED REMEDIES

Some of the remedies to follow are:

(1) Improve teaching and learning activities.
(2) Plan visits to places of interest to whip candidates' interest in the subject.
(3) Teachers should give class work and homework occasionally to students to test the principle of the subject and their skill in Mathematics.
(4) Teaching and learning activities have to be seriously looked at by the school authorities.
(5) Students should lay much emphasis on principle of operation and desist from rote learning.
(6) Students who wish to offer Applied Electricity, which opens the gate for one to pursue Engineering in tertiary institutions must be advised to take Physics and Mathematics lessons seriously.
(7) In this dominating era of electronics, much emphasis should also be laid on the electronics section of the Applied Electricity syllabus.

5. DETAILED COMMENTS

Question 1

Figure 1 is a coil of wire wound on an iron core connected to a battery.

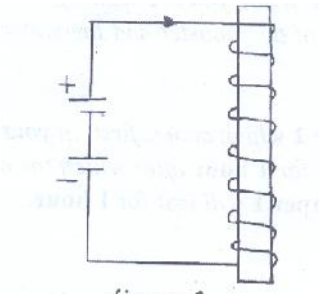


figure 1

(a) Sketch a magnetic field pattern of the current-carrying coil indicating its polarity.
(b) State one rule for the determination of the polarity of the field in 1(a).

(a) Few candidates sketched the magnetic field pattern of the current carrying coil with the polarities correctly indicated.

The direction of the magnetic field pattern should correspond to the North and South poles.

(b) The polarity of the field is determined by either screw rule or right hand rule and not Fleming's right hand or left hand rule.

Candidates' performance was fair.

Question 2

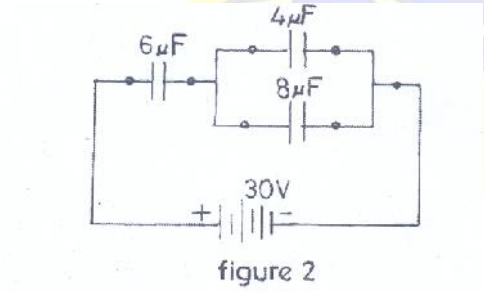


figure 2

In figure 2, calculate the:
(i) equivalent capacitor;
(ii) total energy stored in the circuit;
(iii) charge in the 6 μF capacitor.

A popular and quite good answered question by many candidates. Shen capacitors are connected in series/parallel some students posed problems in solving the question at either resistors connected in series or in parallel.

The fact is that capacitors connected in parallel are treated as resistors in series (i.e $C_T = C_1 + C_2$) and vice-versa. For parallel,

(a) $\frac{1}{C_T} = \frac{1}{C_1} + \frac{1}{C_2}$ or $C_T = \frac{C_1 C_2}{C_1 + C_2}$

(b) Energy (E) = ½ CV2

(c) Charge (Q) = CV

(d) P.d (V) = Q/C

Candidates who could not calculate the correct answer for the equivalent capacitor, had the other problems (b) to (d) all wrong.

Generally, candidates' performance was good.

Question 3

A balanced three-phase delta connected system has a line voltage of 415 V and a line current of 20 A. If the total load on the system is 6000 W, calculate the:

(i) load power factor;
(ii) current in each phase;
(iii) power delivered by each phase.

A poorly answered question by majority of the candidates.

For a balance three-phase load (delta) the correct formula for calculating power (P) $= \sqrt{3} V_L V_L Cos^{-}$ where V_L = Line voltage, I_L = Line current, Cos θ = power factor.

It is from this equation (1) that all others requested, i.e (a) power factor (b) phase current (c) power per phase are derived.

Since it is a balanced connected load, power per phase can simply be calculated:

$$ph = \frac{Total\ \ power}{3}$$

Candidates' performance was poor.

Question 4

(a) Define coulomb.
(b) State the unit of the following quantities:
(i) resistance;
(ii) potential difference.
(c) A d.c. motor supplied from 230 V supply for 1 hour consumes an energy of 36 mJ. Calculate the :
(i) power rating of the motor;

(ii) current taken from the supply.

Another popular and quite good answered question especially (b). However, (a) was poorly defined (i.e coulomb) by many candidates. The coulomb (Q) = c x t.

The quantity of a steady current of one ampere in one second.

For (c) the problem encountered by some candidates are the prefix M and m. The capital M $=10^6$ (mega) and m = 10^{-3} (Milli).

Candidates' performance was good.

Question 5

(a) Explain doping as applied to semi-conductors.
(b) Draw and label the following transistor configurations:
(i) common emitter;
(ii) common collector.

(b) A very poor drawing and labelling of (i) Common Emitter and (ii) Common Collector transistor configurations.

Common Emitter means that the Emitter lead is both common to the input and output likewise the common collector.

Candidates' performance was fair.

Question 6

(a) State:
(i) three properties of an operational amplifier;
(ii) three applications of the operational amplifier.
(b) Sketch an operational amplifier connected in an inverting mode.

(a) Though popular, very poorly answered question. The response to the question indicates that operational amplifier section of the syllabus has not been treated well to enable candidates state some of its properties and applications.

(b) Many of the candidates were unable to sketch an operational amplifier connected in an inverted mode.

Candidates' performance was fair.

Question 7

(a) Define frequency deviation.
(b) State the three frequency components of the amplitude modulation carrier wave.
(c) Draw and label the amplitude modulated carrier wave.

Another poorly answered question with regards to modulation. Many candidates could not answer Section (a) and (c).

It indicates that amplitude modulation has either not been treated or treated but not well understood by the students.

Candidates' performance was generally good.

APPLIED ELECTRICITY 3

1. **GENERAL COMMENTS**

The paper was well set within the scope and standards of the syllabus. The candidates' performance keeps getting better every year and this is attributed to well-structured paper.

2. **A SUMMARY OF CANDIDATES' STRENGTHS**

(1) Compilation of results differed and individual work is clearly seen by way of results tabulation.
(2) Most candidates had very good results.

(3) Majority of the candidates plotted good graphs and calculated the slopes as demanded by the rubrics.

3. **A SUMMARY OF CANDIDATES' WEAKNESSES**

(1) Candidates' inability to draw good graphs still lingers on.
(2) Candidates seem not to understand scales on graph work.
(3) Candidates had difficulties in the determination of the slope.
(4) Most candidates could not draw lines to represent the axes of the graph.
(5) Candidates have difficulties in distinguishing the units required.

4. **SUGGESTED REMEDIES**

(1) Subject masters should teach graph work as part of the teaching.
(2) Candidates must also be given regular assignments to help their development in graphical analysis.
(3) Candidates should on regular basis practise the use of instruments through range function selections.

5. **DETAILED COMMENTS**

Candidates were provided with these apparatus:

one d.c. variable power supply unit (0-12 V);

one d.c. ammeter (0-2 A);

one d.c. voltmeter (0-15 V);

one toggle switch (s);

two filament lamps, L_1 and L_2 (12 W, 12 D c.c.);

a set of hand tools;

connecting wires.

Question 1

Aim: The aim of both experiments is to determine the relationship between current and voltage in series and parallel circuits.

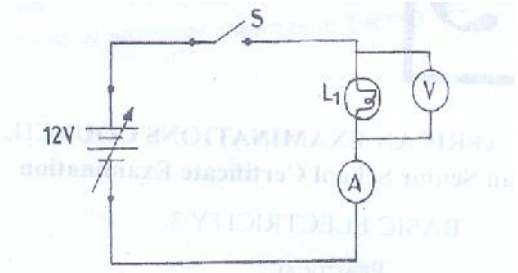


figure 1

(a) **Connect the circuit diagram as shown in figure 1.**
(b) **Ask the supervisor to check the circuit connection.**
(c) **Copy Table 1 into your answer booklet.**

Table 1

Source voltage (V)	Ammeter reading (mA)	Voltmeter reading (V)
0		
2		
4		
6		
8		
10		

(d) **Set the variable power supply unit to 0 V.**
(e) **Close switch (s).**
(f) **Read and record in Table 1, the corresponding ammeter and voltmeter readings.**
(g) **Adjust the power supply unit to 2 V, 4 V, 6 V, 8 V and 10 V and repeat step (f) at each setting.**
(h) **Plot a graph of voltmeter (V) readings on the vertical axis against ammeter (mA) readings on the horizontal axis.**
(i) **Calculate the slope of the graph.**
(j) **Which law does the relationship in step (i) obey?**

Majority of the candidates performed the experiment very well. Most of the candidates had very good results demanded by the rubrics.

Few candidates could not select good scales to plot their graphs.

Generally candidates' performance was good.

Question 2

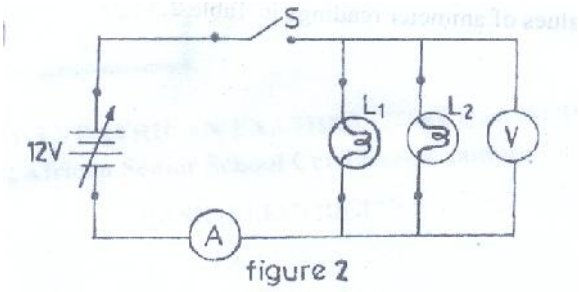


figure 2

(a) **Connect the circuit diagram as shown in figure 2.**
(b) **Ask the supervisor to check the circuit connection.**
(c) **Copy Table 2 into your answer booklet.**

Table 1

Source voltage (V)	Ammeter reading (mA)	Voltmeter reading (V)
0		
2		
4		
6		
8		
10		

(d) Set the variable power supply unit to 0 V.
(e) Close switch (s).
(f) Read and record in Table 2, the corresponding ammeter and voltmeter readings.
(g) Adjust the power supply unit to 2 V, 4 V, 6 V, 8 V and 10 V and repeat step (f) at each setting.
(h) Plot a graph of voltmeter readings on the vertical axis against ammeter readings on the horizontal axis.
(i) Calculate the slope of the graph.
(j) Compare the values of the ammeter readings in Table 1 with the values of ammeter readings in Table 2.

Majority of the candidates were able to set-up the experiment, and therefore had very good results.

Majority of the candidates plotted the graphs but did not use lines of best fit.

Candidates' performance was good.

AUTO MECHANICS 2

1. GENERAL COMMENTS

The standard of the paper was similar to the previous ones taken. Difficulty level of questions were very much the same.

However, candidates' performance continue to decline miserably. Only a few of the candidates performed above average.

2. A SUMMARY OF CANDIDATES' STRENGTHS

3. A SUMMARY OF CANDIDATES' WEAKNESSES

Weaknesses exhibited include:
(1) Gross lack of knowledge.
(2) Poor sketches.
(3) Vague answers.

4. SUGGESTED REMEDIES

(1) Teachers and instructors who teach the subject must do it with zeal in order to motivate students' interest in the subject.
(2) Candidates should practise constantly to produce good sketches.
(3) Candidates must make conscious effort to improve their witting skills in English Language.

5. DETAILED COMMENTS

QUESTION 1

(a) Candidates were to list two types of lubricants used in an automobile industry. Most of the candidates did well by mentioning the liquid and solid lubricants, i.e engine oil, transmission oil, hydraulic oil and grease. The examiner was particularly happy when candidates mentioned synthetic oil one of the latest developments.

(b) Candidates seemed not to understand the question, which required that they should have named the lubricant used in two parts of each of the following system.

Example of what was required id:

(i) Steering:
1. Ball joints use grease
2. Steering gearbox use gear oil/transmission oil

(ii) Suspension:
1. Lower arm joints use grease
2. Leaf spring uses penetrating oil

(iii) Transmission: 1. Universal joints use grease
2. Gear box uses gear oil

(c) (i) Candidates answers were interesting ranging from Secret Automotive Engineering to Superial Automobile Engines. S.A.E – Is an acronym which is Society of Automotive Engineers.

(ii) Candidates were to explain the term SAE 20w/50. A few of the candidates stated what it means.
SAE 20w/50 indicates that the oil is specially designed for winter season and 50 indicates that it can also be used for an engine designed to use SAE 20 to SAE 50. OR
The term SAE 20w/50 refers to multi-grade oil which resists thickening when the temperature decrease, i.e. very cold temperature and thinning when the temperature increases.

(d) Answers given by a large number of candidates to the question 'Name one tool used for greasing' were funny indeed, e.g. engine gun, oil pumping machine and grease trowel were some of the answers given.

QUESTION 2

(a) The question was list two types of engine cooling system. The question was well attempted by majority of the candidates. However, a few mentioned Thermo Syphon cooling and Pump assisted cooling which were incorrect.

The correct answer is (1) Air and Water Cooling Systems.

(b) This part of the question required candidates to sketch one of the types of the cooling system. Majority sketched the air cooled type which was apparently easier. However, sketches produced for both types were haphazardly done.

(c) Candidates were to state two merits of each of the cooling system. While a good number of candidates gave the merits of both the water and air cooled types, a few did not perform well.

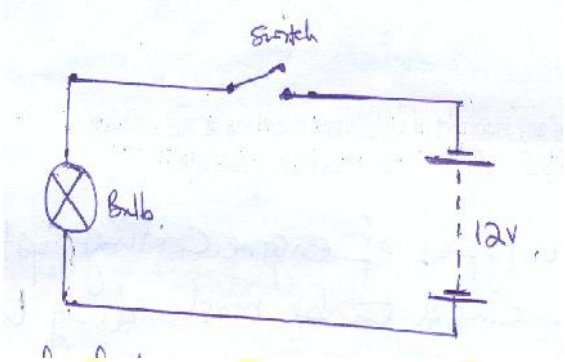
Merits of air cooled engine include:
- It is simple to construct
- It is light in weight
- It is cheaper
- It does not freeze
- It is free from leakage
- It warms up quickly
- Air is readily available
- No topping up of coolant

Merits of water cooled engine include:
- There is reduced mechanical noise
- Temperature of various engine parts are more uniform
- Improved thermal efficiency
- Cylinders can be placed closer together
- The engine can operate under critical condition

Question 3

(a) (i) Candidates were required to sketch an insulated return system. A few of those who attempted the question really sketched the insulated return system and the rest of the sketches were a mockery.

Example of Insulated Return System is below:



(ii) This part of the question required candidates to state the advantages of the earth return system over the insulated.

What was expected include the following:
- Reduced cable length
- Cost of wiring is reduced
- Simplified wiring
- Faults are easier to trace
- Neat arrangement

(b) This part of the question required candidates to state the functions of each of the following:
(i) alternator;
(ii) regulator;
(iv) solenoid switch
(v) starter motor
Those who attempted the question did with various degree of accuracy. The correct answers expected were as follows:

Alternator- An electrical device that supplies electrical energy to recharge the battery.

Regulator - Controls the rate of charge from the generator thus ensuring constant current for the electrical/electronic parts.
Solenoid Switch - connects the battery ignition switch and starter motor together thus causing engine to start.

Starter motor - converts electrical energy to mechanical energy needed to give initial rotation of the engine.

Question 4

(a) A few of the candidates correctly identified the engine as a Two-stroke spark ignition engine while the rest gave incorrect answers such as, two-stroke engine, two-stroke port in engine, etc.

(b) Identification of the parts of the engine was also done by candidates mixing names of parts and also calling of strange names.

The parts of the two-stroke spark ignition that candidates were expected to name were:

Y - deflector
W - transfer port
Y - exhaust port
Z - crankcase

(c) This part of the question required candidates to state the purpose of V (deflector), W(transfer port) and Z (crankcase). Candidates did not perform well at this part.

Answers expected were:

Y - Deflector	-	helps in directing the charge up into the cylinder thus preventing its escape through the inlet port.
U - Transfer Port		Is a passage that allows the partially compressed charge to pass to the upper part of the cylinder.
Z - Crankcase		Serves as a housing for the partial compression of fresh charge. OR accommodates the engine rotating parts.

Question 5

(a) This question was a sketch of a leaf spring and candidates were to identify the following parts labelled J, K, L, M and N. Names were given to some of the labelled parts were nothing to write home about.

The correct names of the labelled parts were:

J - master/top leaf/main leaf
K - U bolt
L - Spring eye
M - axle
N - spring clip/clip

(b) Candidates were to state the purpose of
(i) Swinging shackle
(ii) Centre bolt

A good number of candidates did well in their presentation of both b(i) and (ii). Answers such as Swinging shackles are used to accommodate variation in length of the spring and centre bolt is used to clamp together the leaf springs in position. These were satisfactory answers given by candidates.

(c) Candidates were to state the advantages of independent suspension as compared with the rigid type.

Answers to this part of question by candidates were also acceptable.

Answers given include the following:

- Deflection of one wheel does not affect the other
- More comfortable
- Better steering ability
- Improved rolling resistance
- Lower unspring weight
- Steering geometry is accurately controlled
- Engine can be mounted nearer to the front

AUTO MECHANICS 3

1. GENERAL COMMENTS

The level of this year's paper was not different in terms of level of difficulty and structure from the previous years.

The performance of some few candidates was below average whilst some showed improvement in performance over the previous years.

2. A SUMMARY OF CANDIDATES' STRENGTHS

(a) Some candidates adhered to safety precautions.
(b) Candidates exhibited confidence in approaching the tasks.
(c) Candidates approached the task orderly.
(d) Selection of tools and the use of equipment were done without much trial and error by some students.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

(a) Some candidates found it difficult to select and use tools and equipment provided to perform tasks.
(b) Difficulty in reading to understand the questions and poor pronunciation of some technical words as well as inability to use simple sentences to explain candidates' observations.
(c) Lack of skills needed to perform the tasks given them. Most candidates worked as if they had had no practical experience.
(d) Safety rules were haphazardly observed by most students.

4. SUGGESTED REMEDIES

(a) Candidates must be encouraged to go on practical attachment at well recognized garage and workshops during vacation for the acquisition of skills.
(b) Where schools do not have adequate workshop facilities, students should be taken out frequently to known workshops for practical lessons or training.
(c) Teachers should introduce students to all tools and equipment in the syllabus and how they are used.
(d) During practical training, students must be made to identify all the parts of components and how to identify, test and service faculty ones.

5. DETAILED COMMENTS

QUESTION 1

From the 12 volts battery provided:
(a) Examine the external condition of the battery.
Report to the examiner;

(b) Check the level of the electrolyte in the cell.
Report to the examiner;
(c) Check the relative density of the cell.
Report to the examiner;
(d) Check the voltage of the battery.
Report to the examiner;
(e) Connect the battery to the charger provided.
Report to the examiner;
(f) Disconnect the battery from the charger.
Report to the examiner;
(g) Replace the vent plugs.
Report to the examiner;
(h) Identify three parts of the battery specified by the examiner;
(i) Answer two relevant questions from the examiner.

(a) This question deals with visual inspection. The external condition of the battery must be examined by looking for cracks on the casing, which can result in leakage, cracked vent plugs, free or unblocked or unclogged vent holes, oxidation of the terminal posts. All these should be done after cleaning the battery with clean rag soaked in soda solution and latter wiped it with dry rag.

Most of the candidates did not do any cleaning of the battery and just started with looking for only leakages.

(b) The electrolyte level in the battery cell is checked through the filler hole to see if the plates are well immersed. The level should be at least 10 to 15 mm from the protective shield above the plates. A glass-tube can be used in carrying out this check. If the battery casing is of a transparent one then the “High” and “Low” level line indicators on the casing should be used visually.

Many of the candidates were able to check the electrolyte level with ease.

(c) Checking the relative density of the cell was effectively done by most of the candidates. The approach is to use a hydrometer. In the electrolyte, it should read between 1.200 and 1.350, depending upon the state of charge of the cell. The usual scale is graduated from 1.150 or 110 to 1.4oo or 1300 and may also be marked by coloured bands indicating discharged or recharge, half-charge or recharge, half-charge or fair, and fully charged or good.

(d) Most candidates were able to carry out this check as required.
Checking of the battery voltage is done by using either the High-Rate Discharge Tester or Multimeter. For the High-Rate Discharge Tester, press the probes of the tester firmly against the cell or battery terminals for 5 seconds. Take the voltmeter reading on the tester. In a serviceable and fully charged cell of a battery, the reading will be 1.7 to 1.8 volts for a 12 volts battery. If the voltage is lower, the battery must be re-charged or repaired.

For the Multimeter, press the probe of the red lead on the positive terminal post of the battery and that of the black lead to the negative terminal after setting the range switch of the Multimeter to the desired voltage. Take the voltage reading the same way for the tester mentioned above.

(e) Connecting the battery to the charger provided is done by initially setting the charger to suit the battery to be charged. The red (positive) lead of the charger is connected to the positive terminal post of the battery.

Candidates had no problem in connecting the battery to the charger.

(f) Candidates were able to disconnect the battery from the charger with case. This is done by first taking off the negative lead of the charger and then the positive lead from the negative and positive terminal posts of the battery respectively.

(g) Candidates replaced the vent plugs accurately after making sure that the vent holes are not clogged with dirt.

(h) Few of the candidates were able to identify the three parts of the battery as specified by the examiner. Meanwhile majority were not able to locate the position of the vent hole in the filler cap or vent plug.

(i) Answers to the two relevant questions from the examiner by most candidates indicated that, they have more to learn about the battery as only few of them responded satisfactorily.

QUESTION 2

On the vehicle provided

(a) Check the engine radiator for water leakage.
Report to the examiner;

(b) Check the condition of the upper and lower hoses.
Report to the examiner;

(c) Check the tension of the fan belt.
Report to the examiner;

(d) Remove the fan belt.
Report to the examiner;

(e) Inspect the condition of the fan belt.
Report to the examiner;

(f) Refit the fan belt, adjust to correct tension
Report to the examiner;

(g) Identify three parts specified by the examiner.

(h) Answer two relevant questions from the examiner.

(a) Checking the engine radiator for water leakage was not effectively and satisfactorily done by most candidates since there was not water in the radiator but they were looking out for leakage.

This is done by first making sure that the radiator as well as the cooling system is filled or top-up with water if there is no water in it or the level is low.

(b) Instead of checking for the condition of the upper and lower hoses, most candidates were still checking for only leakage of water.

It means they were totally lost of the idea of the procedure to adopt. The check is done by looking for external internal cracked walls or punctured hoses. Weakness of hoses by squeezing them in the palm to see if it will collapse. All these can lead to lose of coolant and restriction of water circulation.

(c) Almost all of the candidates were not able to carry out this task satisfactorily.

The check of the tension of the fan belt is done by pressing the fan belt down with the thumb. It should not sug for more than 1 mm for a correct tension.

(d) Most of the candidates were able to remove the fan belt as expected. They loosen the alternator adjusting bolt and shifted the alternator for the belt to come easily after moving the alternator towards the engine block.

(e) Inspection of the fan belt is done by taking a visual inspection of it for cracks, feathering, broken or worn out teeth or notches, abrasive cuts and oily surface or dampness.

Only few candidates were able to carry out some few of these checks.

(f) This task was satisfactorily carried by most candidates. To do this, the fan belt is positioned in place on the other pulleys including the alternator one. The alternator is then pushed away from the engine and a leverage is used to tension the belt by pushing the alternator further away and finally locking it into position by the adjusting bolt.

(g) Most of the candidates found it difficult to locate and identify the three parts specified by the examiner such as the thermostat housing, the expansion tank, and the two radiator tanks since the vehicle provided had the cross-flow type radiator where the tanks were located at the sides.

(h) Some few candidates answered correctly the two relevant oral questions. Meanwhile, majority of the candidates could not mention the two valves in the radiator pressure cap. Some of them said the valves are five (5) and others said they are three (3) and mentioned them as inlet valve, exhaust valve, etc. The correct number of valves in the radiator pressure cap are two (2) which are known as the pressure valve and the vacuum valve.

BUILDING CONSTRUCTION 2

1. GENERAL COMMENTS

The paper compared favourably with that of the previous years. It was of the required standard for the level of the candidates. The performance of candidates was above average compared with that of the previous year.

2. A SUMMARY OF CANDIDATES' STRENGTHS

Most candidates were able to:

(1) number their questions neatly.
(2) produce very neat handwritings.
(3) use short sentences and straight forward responses to answer the questions.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

Some candidates :

(1) were unable to use and spell simple technical terms correctly.
(2) could not sketch and label objects correctly
(3) responses showed that they did not prepare very well for the examination.

4. SUGGESTED REMEDIES

(1) Tutors should prepare their candidates very well in terms of frequent class exercises, assignments and quizzes before they sit for the examination.
(2) Tutors should organize field trips to sites to expose them to the practical aspects of the subject.
(3) Teachers should endeavor to complete the Teaching Syllabus with their students.
(4) Candidates should sit down and practice how to answer questions and revise very well before they sit for the examination.

5. DETAILED COMMENTS

QUESTION 1

(a) State one reason for using each of the following mechanical equipment on a construction site:
- **(i) bulldozer;**
- **(ii) mechanical auger;**
- **(iii) Backacter.**

(b) With the aid of a sketch, describe how a wall line is transferred from a profile board onto a concrete foundation.

(c) List three materials used for preventing dampness in substructual works.

Most candidates stated the right responses.

A few candidates were able to produce neat sketches and labelled it to answer the question. Most of them however sketched a trench with a foundation but could not clearly show how a wall line is transferred onto the profile board.

This was a very popular question. Most of the candidates listed the correct materials.

QUESTION 2

(a) List three ways of locating a building line for a proposed building project.

(b) State three advantages of batching concrete materials by weight over batching by volume.

(c) State three functional requirements of a timbering system for trench excavation.

Most candidates who attempted this question could not answer it well. The required response include by using the:

- frontage of existing building as reference.
- road/street kerb line.

Most candidates could not answer this question also well. The required answers include:
- greater accuracy in measuring the materials;
- higher quality concrete is obtained;
- no allowance for bulking of sand is required

Most candidates were able to state the functional requirements of a timbering system.

QUESTION 3

(a) State three advantages of a pitched roof over a flat roof.

(b) List five major operations involved in hanging a wooden door to an existing frame in a sandcrete block wall.

(c) Define the following terms in relations to wall construction:

(i) racking back;

(ii) toothing.

(a) Most candidates produced good responses to answer this question.

(c) Most candidates were not able to list the main operations involved in hanging a wooden door. The main operations involved include:

(i) trim the door to fit the opening;
(ii) provide clearance with a wedge;
(iii) mark and cut the position of the lock/handle/knob
(iv) mark and cut the position of hinges;
(v) fix the hinges to the door and frame;
(vi) fix the lock;
(vii) check the door for free movement.

(c) Most of the responses provided by candidates were correct.

QUESTION 4

(a) State one measure to be taken in preventing each of the following in a suspended timber ground floor construction:
(i) fire spread;
(ii) decay of timber members;
(iii) Insect attack.
(iv)

(b) List five materials used in the construction of a staircase.

(c) State one function of each of the following in door construction:
(i) fan light;
(ii) transom.

(a) Very few of the candidates who attempted this question provided good responses to answer the question. Majority of them stated wrong preventive measures. The required answers include:

Fire spread:
- treat the timber members with fire resistant chemical;
- cover timber members with incombustible materials.

Decay of timber members:
- Introduce vent/blocks for adequate ventilation;
- Treat surfaces of members with water repellent materials/chemicals/oils.

Insect attack:
- Should be treated with preservatives;
- Should be well seasoned.

(b) &(c) Most candidates were able to provide the correct responses to answer these questions.

QUESTION 5

(a) (i) List three types of floor finishes suitable for a college library.
(ii) State three factors to be considered in the choice of a floor finish.

(b) State one function of each of the following in a drainage system:
(i) manhole;
(ii) soakaway pit;
(iii) gully.

(c) List three methods used to ensure personal safety on a building site.

(a) Most candidates were able to provide the correct responses to answer the question.

(b) Most candidates who attempted this question stated correct responses to answer the question.

(c) Most candidates were able to give good responses to explain the causes of accident during roof construction.

(d) Most candidates could not give all the two required answers. Most of the answers centred on protective clothing.

Some of the required answers include:

- no running or horse play on site;
- observing safety instructions;
- inflammable materials such as petrol and explosives should be handled with care.

BUILDING CONSTRUCTION 3

1. GENERAL COMMENTS

The paper compared favourably with that of the previous year. Candidates' performance improved over that of the previous year. It was above average performance.

2. A SUMMARY OF CANDIDATES' STRENGTHS

(1) Most candidates presented neat and well-arranged work.
(2) Majority of candidates numbered their work neatly.
(3) Most candidates were able to use sketches to explain their thoughts.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

(1) Some candidates could not label their sketches well.
(2) Candidates to read and understand the question well before answering them.
(3) Some candidates exhibited lack of knowledge in most of the questions.

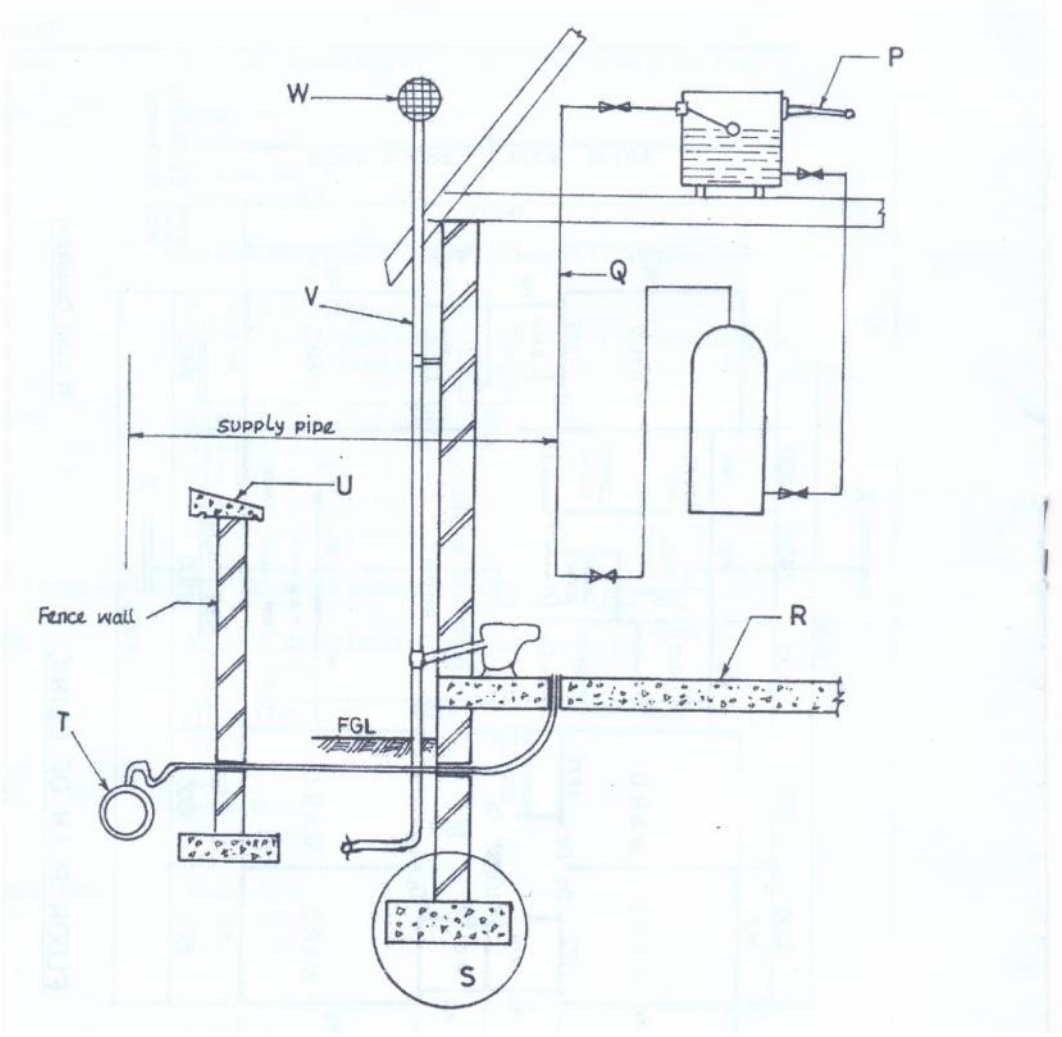
4. SUGGESTED REMEDIES

(1) Tutors should regularly organize field trips to students to broaden their knowledge in the subject.
(2) Candidates should be impressed upon to read the rubrics of the paper and the corresponding questions very well before they attempt to answer the questions.
(3) Tutors should endeavor to complete the teaching syllabus with their students before they sit for the examination.

5. **DETAILED COMMENTS**

QUESTION 1

Fig. 1 shows a cross-section through an external wall of a domestic building, a fence wall and details of a cold water supply system. The ground has a high water table. A wide strip foundation is used to support the walls of the building. Use it answer Question 1.



(a) **Identify the elements labelled P, Q, R, T and V.**

(b) **State one function of each of the elements labelled P, Q, U, V and W.**

(c) **Sketch the constructional detail at S to illustrate the arrangement of the substructural elements from the foundation to the floor slab and label any four parts. (Ignore the details of the cold water pipe work)**

(d) **Reproduce part of the sketch in fig. 1 in line diagram and indicate the following:**

- **(i) communication pipe;**
- **(ii) service pipe;**
- **(iii) water company's mains.**

(e) The external walls are to be set out using a surveyor's theodolite. List any seven tools/equipment or materials to be used for the setting out.

This was a compulsory question and as such was attempted by all candidates

(a)&(b) Most candidates stated varied responses. While some were correct, most of them were wrong.

The expected answers were:

(a)
- V - vent pipe
- Q - cold water rising pipe
- P - overflow pipe
- T - water company's main pipe
- R - grand floor slab

(b)
- V - means of ventilating the system
  - to reduce gas build up
- Q - to distribute cold water to the building
- P - to get rid of excess water
- U - to protect the top of the fence wall from penetration of rainwater
- W - to keep away flies and rodents from getting into the drainage system

(c) Most candidates were able to sketch the constructional detail but most of them could not label the parts very well.

(d) Most candidates could not reproduce the sketch in line diagram. Most of them rather tried to copy the whole sketch again.

(e) Most candidates listed the required tools to answer the question.

QUESTION 2

(a) State two reasons for providing a coping on a fence wall.

(b) Sketch a cross-section through a wooden formwork for a concrete lintel over a door opening in a sandcrete blockwall and label the following parts:
- **(i) sole plate;**
- **(ii) folding wedges;**
- **(iii) cleat;**
- **(v) head tree.**

(c) State eight stages involved in casting a ready-mixed concrete in the formwork in 2(b).

(a) Most candidates' responses were inconclusive.
The required answers include:
- (i) to protect the wall from rainwater;
- (ii) to provide decorative feature for the wall;
- (iii) to prevent seepage of rainwater.

(b) Majority of candidates produced the required sketches to satisfy the demands of the question. The labelling was however not the best.

(c) This question was well answered by majority of candidates.

QUESTION 3

(a) State:
- **(i) four uses of a building and give one example of each;**
- **(ii) six types of rigid floor finishes.**

(b) State the main reason for the provision of a water hydrant on a building site.

(c) Sketch a cross-section through a dependent scaffold erected around a building and label the following:
- **(i) blockwall;**
- **(ii) standard;**
- **(iv) putlogs;**
- **(v) wooden platform;**
- **(vi) guard rail;**
- **(vii) brace.**

(a) The first part of the question was well answered by most candidates who attempted this question. The second part was however badly answered. The required answers include:
- Porcelain tile
- Concrete tile
- Terrazzo flooring/tiles
- Natural stone

(b) Almost all candidates who attempted this question provide the correct response to answer the question.

(c) Most candidates were able to sketch the dependent scaffold. However, some of the parts were wrongly labelled.

QUESTION 4

(a) Sketch a timber stair and label the following parts:
- **(i) nosing;**
- **(ii) riser;**
- **(iii) String;**
- **(iv) Tread.**

(b) State four uses of a working drawing.

(c) Explain the combined system of a drainage scheme for a domestic building.

(d) State two defects associated with lime plastering.

(a) Most candidates sketched the staircase and labelled the stated parts.

(b) Most candidates answered this question very well.

(c) Most candidates who attempted this question could not explain the combined system of drainage. The expected answer is:

A system of drainage where only one pipe is used to convey foul water and surface water to disposal unit for treatment

(d) This question was also not well answered by most candidates. The required answers include:
(i) development of drying shrinkage cracks.
(ii) peeling due to the dislodgement of plaster work from the background wall.

QUESTION 5

(a) Sketch the constructional details at the junction between the stile and top rail of a panel door and label the following parts:
(i) tenon;
(ii) panel;
(iii) mortise;
(iv) top rail;
(v) Stile.
(b) State five reasons for storing building materials on site.
(c) Sketch each of the following symbols used in electrical installation works:
(i) main lighting switch;
(ii) electrical meter.

(a) Most of the candidates who attempted this question could not produce a good sketch to answer the question. Because of this the labelling of the parts were mostly wrong.

(b) Very good responses were stated to answer the question.

(c) Most candidates produced the sketches for the stated symbols to answer the question very well.

QUESTION 6

(a) Explain the term shoring in relation to underpinning works.
(b) State four precautions to be taken when demolishing a building.
(c) State two reasons for keeping accident records on a site.
(d) State four functional requirements of a scaffold.

(a) Most candidates could not explain the term shoring. The expected explanation is:

It is any system of bracing with either timber or steelwork, to give support to a structure and prevent movement during other operations which are being carried out.

(b)&(c) Majority of candidates who attempted this question provided good responses to answer the question.

(d) Most of the candidates could not state very good functional requirements of a scaffold. The required answers include:

ELECTRONICS 2

1. GENERAL COMMENTS

The standard of the paper was good and compared favourably with that of the previous years.
The overall performance compared with that of the previous years was generally fair.

2. A SUMMARY OF CANDIDATES' STRENGTHS

(1) Some of the candidates had indepth knowledge of RLC circuit and logic gates.
(2) Some of the candidates were able to recall formulae correctly.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

(1) Majority of the candidates did not demonstrate knowledge and understanding of electronics.
(2) Majority of the candidates did not answer their questions satisfactorily.
(3) Most of the candidates had difficulty in answering the questions properly.
(4) Most of the candidates did not prepare adequately for the examinations.

4. SUGGESTED REMEDIES

(1) Candidates should be taught the techniques of answering questions.
(2) Candidates should read widely on Electronics textbooks broaden their knowledge in the subject.
(4) Teachers should recommended good textbooks (Electronics) for students.

5. DETAILED COMMENTS

QUESTION 1

(a) Distinguish between analogue multimeter and digital multimeter.
(b) List two examples of analogue meter.
(c) State the function of the following controls used in the cathode ray oscilloscope (CRO):
(i) focus;
(ii) Y-shift;
(iii) X-shift;

(a) Candidates' response to the question was average. Analogue meter has a pointer moving read out (or pointer movement) while the digital has numerical read-out (or numerical display)

(b) Most of the candidates could not respond to this question. The appropriate responses are:

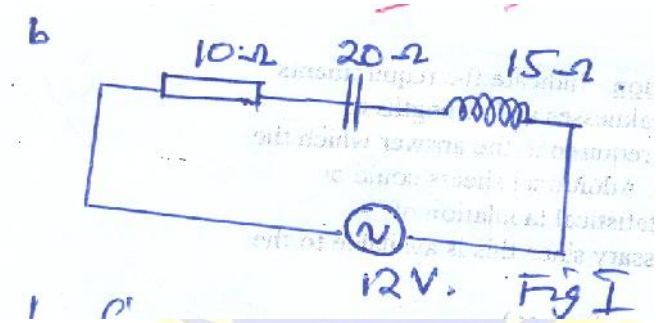
(i) Focus control: Adjusts the spot or trace for a sharp image (sharpens the electron beam).
(ii) Y-Shift: Moves the spot or trace up and down.
(iii) X-Shift: Moves the spot or trace to the left or right (horizontal movement).

Candidates' performance was fair.

QUESTION 2

(a) State two properties of a parallel RLC circuit at resonance.

(b)



In figure 1, calculate the value of

(i) Impedance;

(ii) Total current;

(iv) Voltage drop across the capacitor.

(a) Few candidates responded well to this question. The appropriate responses are:
(i) Very high impedance.
(ii) Current is minimum.
(iii) $X_C = X_L$.

(b) (i) $Z = \sqrt{R^2 + (X_L - X_C)^2}$

$= \sqrt{10^2 + (20-15)^2}$

$= \sqrt{10^2 + 5}$

$= \sqrt{125}$

$= 11.18\Omega$

(ii) $I_T = \frac{E}{Z}$

$= \frac{12}{11.18}$

$= 1.073$ A

(iii) V = 1 x X

= 1.073 x 20

= 21.56V

QUESTION 3

(a) State the rule for biasing a BJT transistor to operate in the active mode.

(b) Draw the circuit diagram for a BJT transistor connected in the common:

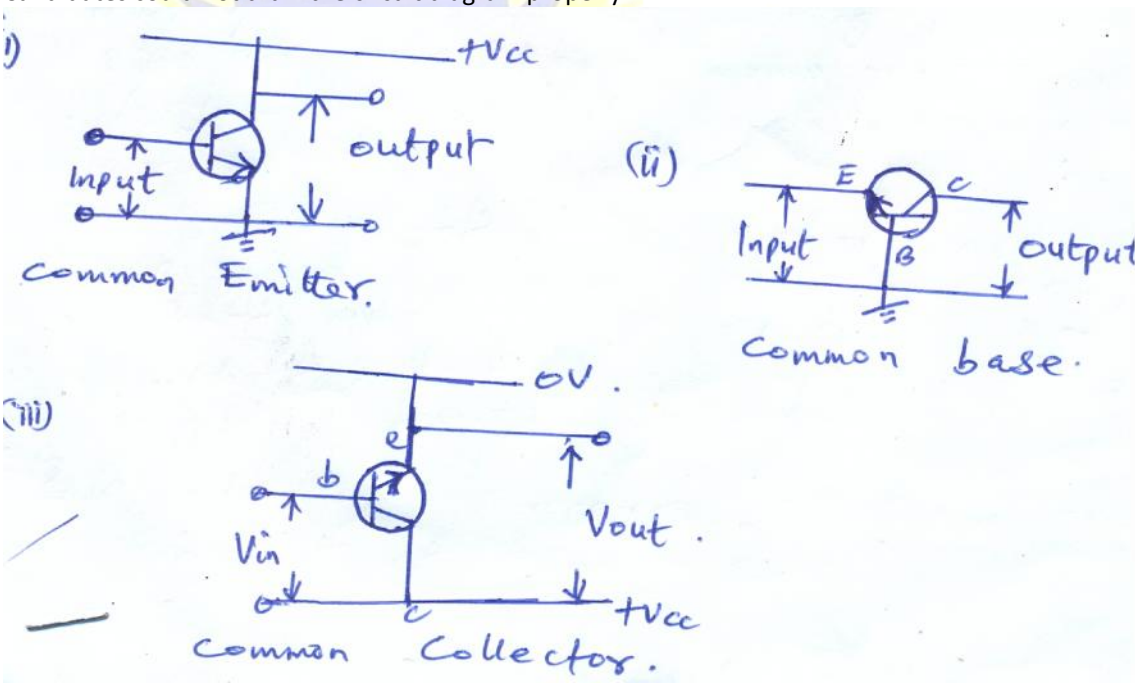
(i) emitter mode;

(ii) collector mode;

(iii) base mode.

(a) Majority of the candidates could not state the rule for biasing a BJT transistor. The appropriate response is: The general rule states that the base-emitter junction must be forward-biased and the collector-base junction must be reverse-biased.

(b) The response to this question was not popular amongst most candidates. Candidates could not draw the circuit diagram properly.



QUESTION 4

(a) State the following laws of electromagnetic induction:

(i) Faraday's Law;

(ii) Lenz's Law.

(b) Trace the magnetic lines of force for the current carrying conductor in figure 2 below:

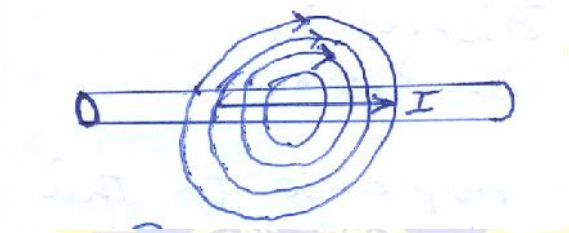
(c) Calculate the energy stored in the magnetic field of a coil of inductance 10mH carrying a current of 2mA.

(a) (i)&(ii) Candidates' response to questions were fair. Some few candidates were able to define Faraday's and Lenz's Laws correctly.

(i) Faraday's Law states that when there is relative motion between a conductor and a negative field, e.m.f. is induced. The magnitude of induced e.m.f. in the conductor is proportional to the rate of change of flux linkage.

(ii) Lenz's Law states that the direction of the induced e.m.f. is such that it oppose the change producing it.

(b) Very few candidates responded well to this question.



(c) This was not a popular question amongst the candidates. Many of the candidates could not answer the question.

$E = \frac{1}{2} LI^2$

$= 10 \times 10^{-3} \times 4/2 \times 10^{-5}$

$= 20 \times 10^{-9} J$

20 nJ

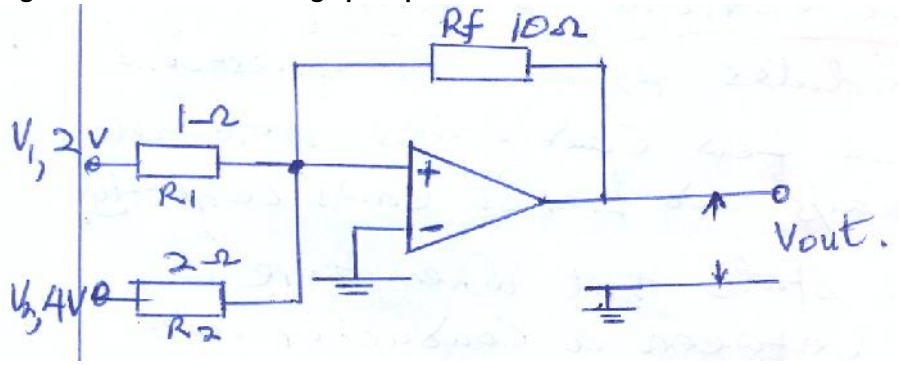
QUESTION 5

(a) State two effects each of:

(i) Positive feedback;

(ii) Negative feedback.

(b) Figure 3 below is a summing op-amp circuit.



In figure 3, calculate the value of the output Voltage (V_{out})

(a) (i)&(ii) Candidates' response to these questions was fair.

The effects of positive feedback are:

(i) increases gain.
(ii) increases distortion.
(iii) decreases bandwidth.

Negative feedback:

(i) decreases gain.
(ii) decreases distortion.
(iii) increases bandwidth.

(b) Candidates' response to this question was very poor. Almost all the candidates could not solve the problem.

$$V_{out} = \left\{ V_1\left(\frac{R_f}{R_1}\right) + V_2\left(\frac{R_f}{R_2}\right) \right\}$$

$$= \left\{ 2\left(\frac{10}{1}\right) + 4\left(\frac{10}{2}\right) \right\}$$

= -(20 + 20)

= -40 V

QUESTION 6

(a) State two differences between a 625 line monochrome and colour television receivers.

(b) In a 625 line colour television receiver, state the frequency of the following units:

(i) horizontal oscillator;
(ii) vertical oscillator;
(iii) sub-carrier;
(iv) sound frequency.

(a) This question was not popular amongst candidates. The response to this question was poor. The appropriate responses are:

(i) Monochrome television receiver has one electron gun, whilst the colour television has three electron guns.
(ii) Monochrome television receiver has a single raster, whilst colour television has three rasters.
(iii) Monochrome television receiver has a single video whilst a colour television receiver has two video signals (luminance and chrominance signals).

(b) The appropriate responses are:

(i) Horizontal oscillator - 15625 Hz
(ii) Vertical oscillator - 50 Hz
(iii) Subcarrier frequency - 4.43 MHz
(iv) Sound frequency - 5.5/6 MHz

QUESTION 7

(a) Draw the truth table for the following:
(i) two-input NAND gate;
(ii) two-input Ex-OR gate.
(b) Draw the circuit symbol of an Ex-OR logic gate.

(a) The candidates' response to this questions were fair. Some candidates were able to draw the truth tables correctly.

(i) TRUTH TABLE

A	B	Z
0	0	1
0	1	1
1	0	1
1	1	0

NAND GATE

(ii) TRUTH TABLE

A	B	Z
0	0	0
0	1	1
1	0	1
1	1	0

EX-OR GATE

(b) Some candidates could not draw the symbol of an EX-OR logic gate.

Candidates' performance was generally good.

ELECTRONICS 3

1. GENERAL COMMENTS

The standard of the paper as compared to previous years was generally very good.
There was not ambiguous question.
Every instructions in the questions were straight forward, well prepared candidates could perform both experiments without difficulties.

2. A SUMMARY OF CANDIDATES' STRENGTHS

(1) Candidates were able to respond appropriately and performed both experiments.

(2) Tables were drawn according to specifications.
(3) Calculations were accurate.
(4) Candidates followed the instructions on the questions very well, this led to their creditable performance.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

(1) Few candidates had difficulties in interpreting the meter readings and could not apply the theory knowledge into practical activities.
(2) Candidates wasted time in providing irrelevant information which was not indicated in the rubrics.

4. SUGGESTED REMEDIES

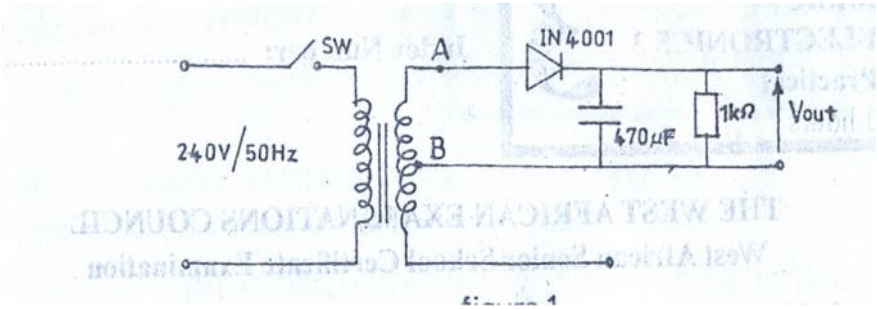
(1) Candidates should be taught effectively how to calibrate meter readings.
(2) Candidates should read the instructions very well before attempting the experiment.
(3) The uses of tools/equipment and their care maintenance should also be well handled by the teachers.
(4) Candidates should be exposed to more laboratory work to build their confidence and skill in practical activities.

5. DETAILED COMMENTS

Candidates were provided with the following apparatus:
one 240 V/9 V centre-tapped transformer;
one multimeter;
two 1N400 a diodes or its equivalent;
one 1 kΩ, ½ W resistor;
one 47 Ω, 2 W resistor;
one 470 µF, 25 VW capacitor;
one single pole toggle switch (sw);
one soldering iron with resin-cored solder;
Veroboard/Quick test board;
connecting wires;
screw driver tester;
long-nose plier;
side cutter.

QUESTION 1

AIM: The aim of both experiments is to investigate the voltage regulation of the half-wave and full-wave rectifier circuits.



(a) Connect the circuit diagram as shown in figure 1.
(b) Ask the supervisor to check the circuit connection.
(c) Copy Table 1 into your answer booklet.

Input Voltage (V) a.c.	Output voltage (V_{out}) d.c.			Percentage voltage regulation	
V_{AB}	R_L = 1 KΩ	R_L = 47 KΩ	R_L (removed)	R_L== 1 KΩ	R_L= 47 KΩ

(d) Close switch (sw).
(e) Measure and record in Table 1 the voltages V_{AB} and V_{out}.
(f) Open switch (sw) and replace the 1 KΩ resistor with the 47 KΩ resistor.
(g) Repeat steps (d) and (e).
(h) Open switch (sw) and remove the 47 KΩ resistor.
(i) Repeat steps (d) and (e) for no resistor in the circuit diagram.
(j) Open switch (sw).

(k) Using the formula:

$$\text{Percentage regulation} = \frac{\text{No load voltage} - \text{full load voltage}}{\text{full load voltage}} \times 100.$$

Calculate the percentage voltage regulation of the half-wave rectifier circuit for the:

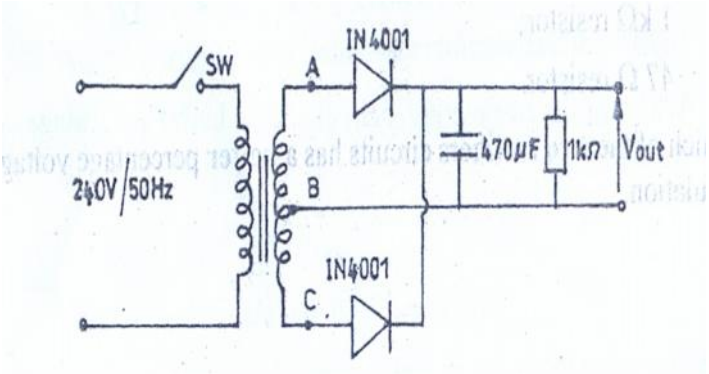
(i) 1 KΩ resistor;
(ii) 47 KΩ resistor.

The question required the candidates to construct and perform experiment on halfwave rectifier circuit.

Candidates were able to perform the experiments successfully. Few could not connect the load resistor to obtain the appropriate response.

Candidates' performance was generally good.

QUESTION 2



(a) Connect the circuit diagram as shown in figure 1.
(b) Ask the supervisor to check the circuit connection.
(a) Copy Table 2 into your answer booklet.

Input Voltage (V) a.c.			Output voltage (V_{out}) d.c.			Percentage voltage regulation	
V_{AB}	V_{BC}	V_{AC}	R_L = 1 KΩ	R_L = 47 KΩ	R_L (removed)	R_L== 1 KΩ	R_L= 47 KΩ

(b) Close switch (sw).
(c) Measure and record in Table 2 the voltages V_{AB}, V_{BC}, $V_{AC}$and V_{out}.
(d) Open switch (sw) and replace the 1 KΩ resistor with the 47 KΩ resistor.
(e) Repeat steps (d) and (e).
(f) Open switch (sw) and remove the 47 KΩ resistor.
(g) Repeat steps (d) and (e) for no resistor in the circuit diagram.

(h) Open switch (sw).
(i) Using the formula in experiment 1 step (k), calculate the percentage voltage regulation for the:
(i) 1 KΩ resistor;
(ii) 47 KΩ resistor.
(j) Which of the two rectifiers circuits has a better percentage voltage regulation?

The question required the candidates to construct and perform experiment on fullwave rectifier circuit.

Majority of the candidates had very good result for this experiment, i.e. V_{AB}, V_{BC} and R_L= 1 KΩ, however, most candidates could not calculate the percentage voltage regulations for the R_L= 1 KΩ and R_L= 47 KΩ.

Candidates' performance was good.

INFORMATION AND COMMUNICATION TECHNOLOGY (ELECTIVE) 2

1. GENERAL COMMENTS

This paper is the second May/June ICT administered. The standard of the paper compared favourably with the maiden paper in the areas of content and level of difficulty.

Although the paper was supposed to have been well within reach of the candidates, the general performance happened to be just slightly better than the first.

On the whole, the performance was just average.

2. A SUMMARY OF CANDIDATES' STRENGTHS

(1) Most candidates responded to the question as demanded by the rubrics.

(2) A few candidates exhibited good knowledge of the subject matter.

(3) Some candidates expressed themselves very well in the English Language.

(4) Candidates showed delve knowledge in the impact of Information Technology in everyday life.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

The candidates' weaknesses identified include:

(1) Inability to appreciate the key requirements of the questions.

(2) Inadequate preparations.

(3) Poor communication skills.

(4) Some of the candidates had bad handwriting.

(5) Some candidates demonstrated in their answers that they have *little or no knowledge* of the examination syllabus.

4. SUGGESTED REMEDIES

(1) Candidates should carefully read through the questions, selecting those to be attempted and planning the answers before writing them out.

(2) Candidates should learn with suitable textbooks and material on ICT and careful use of the Internet as a learning tool.

(3) Candidates should avoid the use of communication styles on the various social media platforms.

(4) Candidates should have time to read through their answers to correct any errors as well as add further details.

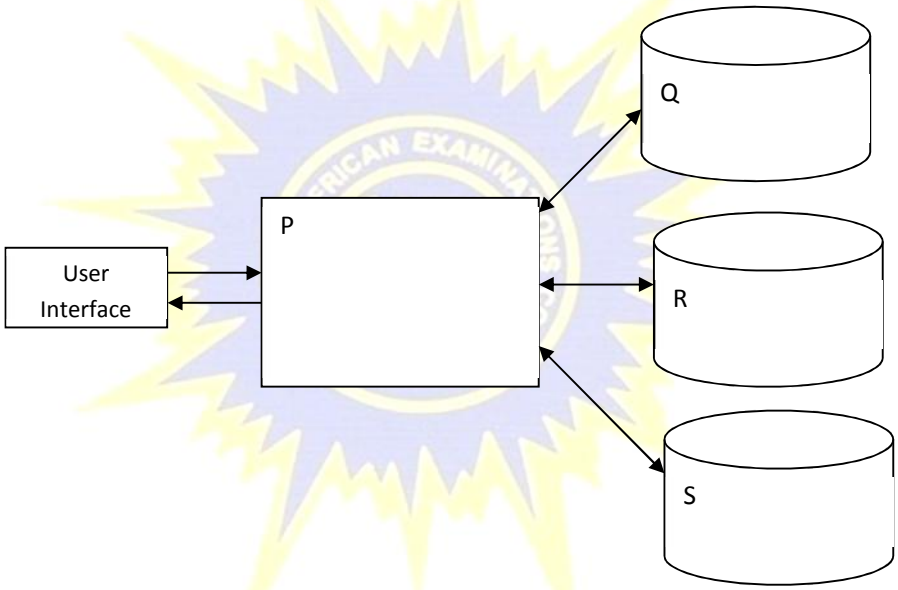
(5) Candidates should be reprimanded for bad handwriting, to enable them improve on their handwriting.

(6) Teachers using the ICT Elective syllabus should make it their first point of teaching in the schools.

5. DETAILED COMMENTS

QUESTION 1

(a) What is meant by the term information system?
(b) List three types of information systems.
(c) The diagram below represents a decision support system. Identify the components labeled P, Q, R and S.



Majority of candidates did not provide correct answers to this question. Suggested solution is as follows:

(a) An Information System is any formalized set of procedures that is capable of accepting data from any source, processing the data and making the results available to users.

(b) – Transaction Processing Systems / Operation Support System

- Office Automation Systems

- Knowledge Work Systems

- Decision Support Systems

- Management Information Systems / Management Support System.

- Executive Support Systems

(c) P – Planning Language/Dialogue System

Q – Corporate Database

R – User Database

S – Model Database

QUESTION 2

Information Technology continuous to impact on everyday life. State two benefits of each of the following:

(a) e-health;
(b) e-learning;
(c) e-banking;
(d) telecommuting;
(e) telesales.

Almost all candidates who attempted this question got full marks. Performance was excellent.

QUESTION 3

(a) List two steps of the machine execution cycle in the processing of data.
(b) Explain two of the steps listed in 3(a).
(c) Differentiate between
(i) device driver and language translator;
(ii) word size and bus size.

This is the most unpopular question among candidates. The few who attempted had very low marks. Suggested solution is as follows:

(a) -Fetching

-Decoding

-Executing

-Storing

(b) **Fetching**

This is the process of obtaining a program instruction or data item from memory.

Decoding

This is the process of translating the instruction into commands that the computer understands.

Executing

This is the process of carrying out the commands and executing.

Storing

This is the process of writing the results to memory or register.

(c) (i) A device driver is software that allows high-level computer programs to enable hardware devices function appropriately, while a language translator is software that converts programmers' source code into object code.

(ii) A word size of a computer is the number of bits that the CPU can process simultaneously, while the bus size determines how many bits are transmitted at a time.

QUESTION 4

(a) State one function each of the following computer network devices:
(i) bridge;
(ii) repeater;
(iii) router.
(b) Name the layer of the OSI model at which each of the devices listed in 4(a) operates.
(c) List the two types of network transmission media.

The performance of candidates' on (a) and (c) was average but could not provide correct answer to the (b) part. The expected answer is:

(a) (i) **Bridge:**

- They connect networks
- Used in dividing network segments
- Used to increase performance on a high-traffic segment.

(ii) **Repeater:**

- They boost up signals to their original strength
- They retime and retransmit signals to another segment.
- They essentially enable a number of cables segments to be treated as a single cable.

(iii) **Router:**

- They connect multiple networks.
- They determine the best path for sending data.
- They filter signals
- They repeat signals

(b) **Bridge**- They operate in the data link layer of the OSI model.

Repeater- They operate at the physical layer of the OSI model.

Router- They operate at the network layer of the OSI model.

(c) - Wireless

- Wire/Cable

QUESTION 5

Construct a hexadecimal addition table.

Most candidates attempted this question but was the worst answered without any correct table.

Candidates should add in hexadecimal and fill the various cells, noting that in hex, the decimals 10, 11, 12, 13, 14 and 15 are denoted by A, B, C, D, E and F respectively.

INFORMATION AND COMMUNICATION TECHNOLOGY (ELECTIVE) 3

1. GENERAL COMMENTS

The standard of the paper and that of the previous year's examination is the same. It was noted that, candidates' performed very much better than the previous year.

It has, however, been observed that performances were localized, i.e. excellent performances are concentrated at schools while bad performances are also concentrated at certain schools.

The variance of performances at localities is insignificant. It is either entirely good or entirely bad.

Candidates' general performance was good.

2. A SUMMARY OF CANDIDATES' STRENGTHS

(1) Majority of the candidates were able to present CDs with data.

(2) Most candidates responded to the demands of the questions as demanded by the rubrics.
(3) Most of the candidates were able to code in HTML.
(4) Candidates were able to enter data.

3. A SUMMARY OF CANDIDATES' WEAKNNESSES

1. A number of candidates used Microsoft Word for the database application.
2. Candidates did not name objects properly.
3. Usage of the header facility in the table was wrongly effected.
4. Candidates were unable to create the database relationships.
5. Candidates were unable to produce the database relationships reports.
6. Candidates shied away from programming aspects – especially QBASIC.

4. SUGGESTED REMEDIES

1. Teachers should try and start teaching ICT elective from programming perspective. Candidates are more likely to be able to learn the use of application better than they can do in learning programming on their own.

2. Teachers must cultivate logical reasoning skills in candidates to help in the development of programming skills.

3. Teachers must pay attention to the curriculum requirements and should not underrate the expectations of the ICT curriculum. They must stress on technical approach in teaching ICT.

4. Candidates must be encouraged and assisted to pick up personal ICT projects structured in a manner which will compel them to eventually be practical in their approach to the subject.

5. DETAILED COMMENTS

QUESTION 1

HTML

The question required candidates to create an html web page. It required the use of a *Text Editor.* This time round, candidates used text editors in the coding HTML.

The solution to the question is expected to follow the pattern explained below.

HTML is a standard and the layout follows a specific structure to allow for correct interpretation for presentation. The structure of an html document is as follows:

```
<!DOCTYPE html>
<html>
<head>
<title>Title of the document</title>
</head>

<body>
The content of the document.....
</body>
</html>
```

It must be noted that the title is part of the head tag. Placing it outside the head is not a correct structuring even though you can have the title correctly displayed.

The body tag is not part of head tag as some have sort to do. Even though an example of indentation was given in the question, candidates still failed to indent properly.

Indentation is not considered critical for the structure tags i.e. html, head, title, and body. Rather, it is the lines coded between the opening and closing sets of any of the tags that are critical.

The arrangement :

```
<p>
    <u>Items</u>
</p>
```

has been given in the question as *an example.* Yet candidates did not perform indentation. …. is a set of paragraph tags. Within this paragraph a content of the paragraph is entered as *Items.* This content is underlined using the <u>….</u> set of tags.

All that candidates should have done is to copy this example given and change the tags to suit the exact work required of them.

A sample answer is as shown below:

```
<!DOCTYPE html>
<html>
<head>
<title>
```

```
Candidates' name and Index Number goes here
                    </title>
                    </head>

                    <body>

                        <p>
These are my to-do list in no particular order:

                        </p>
                    <!--  List  the items using Unordered HTML Lists as implied in the
                    line above. -->

                        <ul>
                            <li>Do assignment</li>
                            <li>Wash</li>
                           <li>Watch a movie</li>
                        </ul>
                        </body>

                        </html>
```

Performance of most candidates' was good.

QUESTION 2

DATABASE

The requirement is for candidates to use a database application to design a database for a distribution company and name it ***ClientOrders*** in the folder they will create in drive C:\.

The very exact naming of the database is critical. Its placement in the folder created is critical. You can manually search for a document on the computer through various techniques even if you forgot the name. However, during the execution of a program, the name and its location must be ***exact*** otherwise the program cannot find it.

Some candidates used Microsoft Word to answer this question. Microsoft Word is not a database application.

Three tables were required to be created defining the fields appropriately:- tblClients, tblOrders, tblStock.

Defining the fields appropriately implies that the field names must be correct and their data types must be correct. A table with a wrong field data types is not a correct table.

Some candidates did not name the tables properly. Others defined all fields as type *Text.* This is not correct in some instances.

The created tables are to be used to create the relationships to enable a user to design a form to show *Client Name, Location, Telephone, Item Order Date.*

To finaly link the relationships, select the primary key from one table and dragg it to the same field in another table. For the relationship between *tblClients* and *tblOrders,* select the primary key *ClientID* from table *tblClient* and drag it to *ClientID* in the *tblOrders* table. Also establish relationship between tblOrders and tblStock using the same proceedure.

To finaly link the relationships, select the primary key from one table and drag it to the same field in another table. For the relationship between *tblStock* and *tblOrders,* select the primary key ItemID from table *tblStock* and drag it to ItemID in the *tblOrders* table.

Select the form field from the tables that contain them.

As you change the table selection in the *Table/Queries* tab the *Available Fileds* also will change accordingly. From the fields that display, select the fiekld you want from it. Continue to change the tables and select desired fields unltil all fileds for the form as display in the *Selected Fields* tab.

The next stage is the insertion of full name and system date into the footer. This is system date and not date manually entered by candidate.

Create space for the form footer section either by dragging the borders or setting height option in the *FormFooter* toolbar on the right side of the screen.

Now insert a label or labels by selecting *Ab* from the Design Menu bar and opening up a sized label in the footer for inserting name. You may clean off the entry in the form header since it is nor required.

Edit the labels t of the form to read exactly what is in the question. Finish by saving your work. The name must be *frmOrders*.

A relationship report is required to be produced and saved as R_report in the database. This is achieved by selecting from the Database tools menu *Relationships* and then select *Relationship Reports.*

Performance was average.

QUESTION 3

QBASIC

Candidates were not able to carry out this work except for an exceptional few. The following is a basic outline pseudo code with some sample codes added to assist test coding for solving the problem.

DECLARE VARIABLES

```
DIM Number AS INTEGER

DIM Count AS INTEGER

DIM Counter AS INTEGER
```

DECLARE A TEMPORAL STORE OF DATA e.g. ARRAY

Note: In the formatting of the output, it must be noted that the first column is the original data while the second column is the sorted data. Hence both the sorted data and the unsorted data must be available at output time.

Thus, the declared variables must include at two arrays, one for the raw data and one for the sorted data. The two of them must hold the same information before sorting starts. Let us call these two arrays as UNSORTED_ARRAY_LIST and SORTED_ARRAY_LIST for this work.

```
DIM UNSORTED_ARRAY_LIST(6) AS INTEGER

DIM SORTED_ARRAY_LIST(6) AS INTEGER
```

There are six (6) known items to be sorted and therefore we input data six times only:

```
Number=6
```

CLEAR SCREEN

```
CLS
```

START LOOP TO READ INPUTS VARIABLES FOR NUMBER OF RECORDS GIVEN

```
FOR Count = 1 TO Number
```

INPUT A RECORD INTO A TEMPORAL STORE CALLED tmp

```
Input "Enter a Number";tmp
```

STORE RECORD IN **UNSORTED_ARRAY_LIST**

```
UNSORTED_ARRAY_LIST(Count)= tmp
```

STORE RECORD IN **SORTED_ARRAY_LIST**

```
SORTED_ARRAY_LIST(Count)=tmp
```

LOOP UNTIL LAST RECORD IS READ
    Next Count

At the end of the above loop, UNSORTED_ARRAY_LIST and SORTED_ARRAY_LIST will both contain the same values.

NOTE: It is possible to do this in many other ways. Bear in mind that simply saying UNSORTED_ARRAY_LIST = SORTED_ARRAY_LIST as a way of putting the values of one array into the other has its implications that has to be properly resolved, else depending on the environment you may end up having them always containing the same values throughout the program execution.

This is not what is wanted in this instance. We want to be able to change the values in one array without affecting the values in the second array. Thus, we store values in them separately.

PERFORM SORTING

To perform the sorting on the SORTED_ARRAY_LIST and leave the UNSORTED_ARRAY_LIST untouched!

Using Bubble sort algorithm in its beginner form, sort *only* SORTED_ARRAY_LIST

```
FOR Count = 1 TO Number
    FOR Counter = 1 TO Number
        IF SORTED_ARRAY_LIST (Counter) > SORTED_ARRAY_LIST
(Count) THEN SWAP SORTED_ARRAY_LIST (Count), SORTED_ARRAY_LIST
(Counter)
    NEXT Counter
NEXT Count
```

'OUTPUT HEADER TO SCREEN

```
PRINT

PRINT

PRINT "NUMBER", "SORTED"

PRINT "******", "******"

PRINT
```

The comma (,) provides the spacing. Using semi colon (;) will make the "NUMBER" and "SORTED" to be joined together leaving no space.

FORMAT *OUTPUTDATA* and OUTPUT *OUTPUTDATA* TO SCREEN Row by Row.

Start a LOOP to output the 6 lines

```
FOR n = 1 TO 6
```

FORMAT OUTPUTDATA

Note: In formatting the output, the values on the rows for the left NUMBER column will come from the UNSORTED_ARRAY_LIST while the values for the right SORTED column will come from the SORTED_ARRAY_LIST

The values will be matched one-to-one. That is, the n^{th} value of UNSORTED_ARRAY_LIST will be outputted together with the n^{th} value of the SORTED_ARRAY_LIST.

OUTPUT OUTPUTDATA TO SCREEN

The following QBasic statement formats will output the result all together. The *PRINT* is for output while *UNSORTED_ARRAY_LIST(n), SORTED_ARRAY_LIST(n)*is the formatting.

PRINT UNSORTED_ARRAY_LIST(n), SORTED_ARRAY_LIST(n);

The *print* command sends the output to screen. The *UNSORTED_ARRAY_LIST(n), SORTED_ARRAY_LIST(n)* is what goes out together with its formatting. UNSORTED_ARRAY_LIST(n) is the n^{th} value for the left side under the column heading “NUMBER” the comma (,) formats the space between the columns. SORTED_ARRAY_LIST(n)is the matching n^{th} value to the right under column named “SORTED”.

Continue if it is not yet done 6 times

NEXT n

END

CLEAR SCREEN
CLS
EXIT

METALWORK 2

1. GENERAL COMMENTS

The standard of the paper is comparable to that of recent examinations. The performance of candidates, on the whole, was not encouraging. However, there were isolated cases of good performance.

2. A SUMMARY OF CANDIDATES' STRENGTHS

(1) A few candidates presented their work in very clear and logical manner.
(2) Majority of the candidates attempted all the four questions they were expected to answer.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

The main weaknesses of the candidates were:
(1) Poor sketching skills.
(2) Low mastery of the subject matter.

4. SUGGESTED REMEDIES

(1) Candidates should do a lot of practical work to enhance their competence.
(2) Candidates should be encouraged to develop much interest in the subject and endeavor to cover the entire syllabus.

5. DETAILED COMMENTS

QUESTION 1

(a) The candidates were to state three metalworking operations for which goggles must be worn. This question was attempted by most candidates and their performance was good.
(b) Generally, candidates could state one merit each of dot punching and centre punching. However, some of them could not state one merit for applying chalk on the surface of a steel rule, which is to make reading of measurements very easy.
(c) (i) Majority of candidates could explain an alloy.
(ii) The effects of alloying metals with chromium and tungsten are to improve hardness, corrosion, resistance and wear resistance at high temperature respectively. Some candidates proved to have little or no knowledge of this aspect of the subject.

QUESTION 2

(a) This was a popular question and candidates could state two effects of tempering on the properties of hardened high carbon.
(b) Candidates provided good responses for this part of the question.
(c) This part of the question required candidates to explain the term "forging". Majority of them provided good answers.

(d) (i) Very few candidates could state the use of swags are used to finish off round work.

(ii) Those who attempted this question stated the use of a part of the anvil and not the general use, that is, forging processes are carried out on the anvil.

QUESTION 3

(a) Candidates were to sketch a buttress thread and label four of its parts. This question was attempted by most candidates. However, they could not sketch the buttress thread but provided sketches of other thread forms.

(b) The question was in two parts:

(i) Candidates could not explain 'core print', a foundry term correctly. It is a small projection at the end of patterns which provide recess for accommodating cores in the mould.

(ii) The performance of candidates in this part of the question was not encouraging. In foundry, a cavity is an opening created by the pattern in the sand to allow molten metal to take the form of the finish product.

(c) The question was on stating one quality of moulding sand. General performance was good.

QUESTION 4

(a) (i) Candidates were to state two reasons why metal surfaces are protected. Many of the candidates answered quite well this question.

(ii) This question required candidates to list three methods of protecting metal surface from corrosion. A fair number of the candidates answered this question and performed well.

(b) (i) The question required candidates to sketch a folding bar in use, and explain the process. The sketches provided were very bad and the explanations not clearly and logically presented. A folding bar with a metal between the two bars are held in a bench vice firmly. A raw hide or plastic mallet is then used to strike the metal piece to bend it over the folding bar to the required shape.

(ii) Candidates were to sketch a sand bag in use and explain the process involved. Performance was not good since most candidates could not sketch the sand bag in use.

QUESTION 5

This was not a popular question and majority of the candidates who attempted it performed poorly.

(a) (i) Candidates were to state two design questions which may serve as a guide when evaluating a finished product. Majority of the candidates were not able to provide good responses. Some of suggested design questions are: How well does the end product function? Does it meet the needs of the user? Does the end product look good? Is the end product safe to use? Can the end product be maintained easily?

(ii) This part of the question demanded that candidates explain the term specification as used in design. Some candidates could not explain the term, which may be explained as statements which clearly outline the specific

details or requirements that an expected design must satisfy in order to be successful.

(b) (i) Candidates could not identify the tools labelled R S T U and V. The correct answers to the question should be as follows:

R - Screw cutting tool
S - Knurling tool
T - Parting-off tool
U - Tapering tool
V - Boring bar

(ii) The question was not well answered. Candidates were to state the operations being carried out with the tools labelled in (b)(i). The correct answers to the question should be as follows:

R - Screw cutting
S - Knurling
T - Parting-off
U - Tapering
V - Boring

METALWORK 3

1. GENERAL COMMENTS

The quality of the paper was within the required standard of the level tested. The paper was prepared to meet the scope of the senior high syllabus in Metalwork.

Generally, the performance of candidates was quite above average standard and that the standard of the paper and candidates' performance could be compared equally well with those of previous years.

On the whole, the candidates' performance in either of the two tests of the paper was satisfactory.

2. A SUMMARY OF CANDIDATES' STRENGTHS

(1) Many of the student attempted producing all the parts making up the assembly.
(2) Some candidates were very cautious of good safety practices and applied appropriate finishing to make the completed artifact safe handling.
(3) Many candidates worked close to the specified dimension plus for good dimensional control.
(4) Candidates showed good cutting practices by employing appropriate cutting tools.
(5) Improved ability to interpreting detailed drawings and realizing the actual product.
(6) Candidates could round off the specified corner with 10mm radius.
(7) Candidates' finished work bore the exact resemblance of the intended artifact.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

(1) Failure of candidates applying right marking out practices. Many candidates failed to mark out scribed lines or metal as well as dot punching to pronounce and make scribed lines clear and conspicuous.
(2) Cutting to the correct form, especially the 45ºcutting to fit.
(3) Many candidates failed to file to size to obtain appropriate transitional fit between the parts.
(4) Come candidates failed to drill the two relief holes; the relief holes were necessary to facilitate assembly.

(5) Assembled Part A and Part B showed wide gaps around cut and filed portions which were quite beyond the specified tolerance and fit.
(6) Majority of the candidates who registered for the examination failed to choose the alternative test – requiring machining operation; especially the use of the centre lathe.

4. SUGGESTED REMEDIES

(1) Candidates should always mark out the patterns or shapes given in the detailed drawing on the metal plates supplied before commencing all cuttings and if possible filing.

(2) Dot punching should follow the scribed marking to provide better and clearer markings than the scribed times.
(3) Candidates should learn to use the bevel gauge to mark out the 45º shape.
(4) Candidates should control the filing process by selecting correct and appropriate files.
(5) Candidates should learn to apply frequent checks using calipers and steel rule as the filing progressed. This could reduce over filing.
(6) Candidates should be offered much opportunity to practise drilling operation.
(7) Exercises on the centre lathe should be vigorously pursued.

5. **DETAILED COMMENTS**

Candidates were given two tests to choose one involving a fitting exercise and a machining exercise. However, many candidates attempted the Test A – consisting various basic bench fitting operations.

TEST A

Candidates were supplied with flat mild steel plate, 65 mm x 65 mm x 3 mm – 2 off to enable candidates produce parts per the detailed views given.

PART A

Candidates were required to use one of the materials supplied to produce Part A. The students were expected to mark out the shape per the given dimensions. After the marking out, the candidates were required to dot punch through the scribed lines. This was a process which many candidates failed to follow, hence, resulting in rough cut out. The cut out should have small allowance – extra material close to 0.5 mm or 1 mm for filing to the actual size and shape.

The L-like shape was simple to produce except the lower part which was more or less an enclosed shape proved relatively difficult to produce. Candidates could hacksaw the sides that formed the slot and remove the base either with appropriate chisel or drilling and finally filing to shape. The 45ºform and shape could be cut and file to size.

PART B

Similarly, the candidates were required to use the second metal piece measuring 65 mm x 65 mm x 3 mm to produce Part B.

The profile of the shape ought to be marked out accurately on the metal plate. Candidates were required to dot punch the profile accurately marked out to represent a clearer shape for cutting out. Again, the difficult aspect of the work was the internal cutting of the slot to match the Part A projections and slots. Careful chiseling or drilling could solve the difficulty. The corresponding 45º form or shape ought to be cut and finish filed to fit similar form on Part A.

With all the difficulties many candidates were able to obtain neat cut offs.

The bottom corners of the slot ought to be relieved by drilling two Ø3 mm holes to ensure easy fitting.

Finally, the right hand side bottom face relative to the vertical face should be rounded to 10 mm radius to complete the Part B.

The Part A should have transitional fit with Part B when assembled together.

TEST B

Candidates were supplied with one piece free cutting wild steel rod, Ø50 mm x 120 mm to produce a stopped shaft as was indicated in a diagram showing the detailed view.

Candidates were expected to face two ends of the shaft to the required length 105 mm. The workpiece mounted between centres should be turned down to 40 mm diameter and 30 mm length.

The workpiece should be further reduced to 30 mm diameter starting from the end of the previous end to additional length of 40 mm. From this, the shaft diameter should be turned to 30 mm diameter to the end of the shaft length.

Candidates should select suitable undercut tool to groove the undercut 5 x 2 deep 15 mm length from the end of the shaft. Having completed these operations, the tool could be set to cut the chamfer 45ºx 2 at the left end of the shaft.

A finishing tool could be fixed to finish machine the shaft to the specified tolerance of finish.

Candidates could further use smooth file, running the machine at moderately high, to carefully remove all sharp edges emanating from the step turning.

TECHNICAL DRAWING 2

1. GENERAL COMMENTS

The standard of the paper was on the average, but candidates' performance was below average.

The paper covered many topics that have been occurring yearly but most candidates could not digest well before attempting.

2. A SUMMARY OF CANDIDATES' STRENGTHS

(1) Candidates did well in copying the given views. The outlines were clearly differentiated from the construction lines.
(2) The construction of the link mechanism was averagely done. Candidates placed point 'P' at the correct position and divided the circle into twelve equal parts.
(3) For the cone construction, the projectors to the plan and end elevation was well done.
(4) Most candidates copied the given irregular quadrilateral and only few tried and constructed the square equal to twice the quadrilateral. Few of the construction lines conformed to the required convention.
(5) Few candidates did well in the scale selection and drew the space diagram to the given scale. All the five forces were well placed at the given positions. Likewise for the force diagram and the funicular polygon.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

(1) Candidates should have carefully read the questions before answering them.
(2) Some of the solutions provided suggested that candidates failed to critically analysis the requirements for the questions.
(3) There were similarities of the previous ones to the present questions. Candidates failed to realize that, most deviated especially on questions, two, three and five.
(4) Centre lines drawn did not conform to the conventional representation.
(5) BB pencils were used for outlines.
(6) Projectors not at perpendicular to the cutting plane.
(7) Unable to transfer the appropriate distances from the plan to locate the true shape of the cut surface, i.e the procedure for construction of true shape was poor.
(8) Scale convection was poor. Candidates were unable to construct the force diagram, thus unable to locate the magnitudes of the reactional forces.

4. SUGGESTED REMEDIES

(1) Revision by using past questions are necessary but candidates should consider carefully when similar questions occur in the papers being written.
(2) Convectional representation of centre lines and other use of types of lines and pencils for construction have yearly been stressed. Tutors are reminded to place premium about them and ensure that students follow the trend.

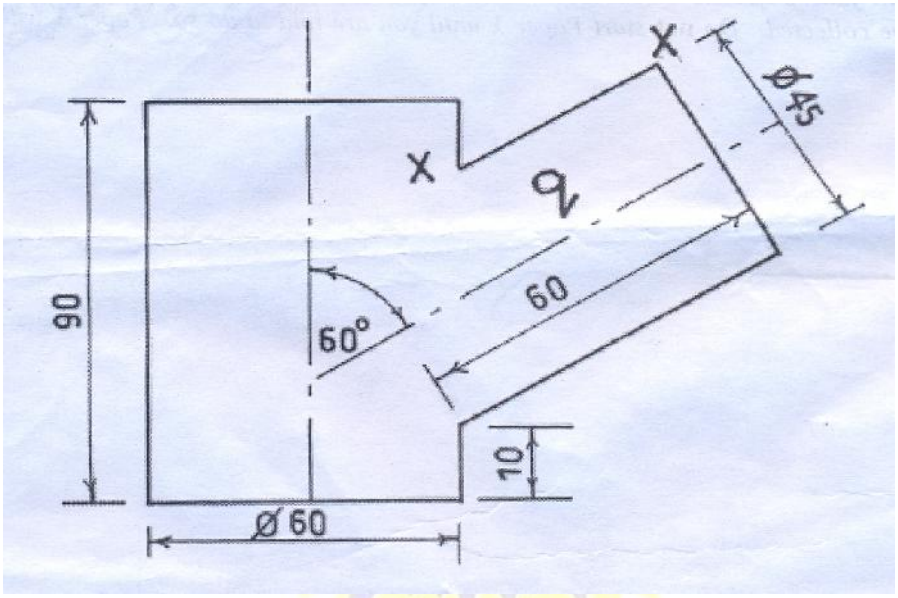
(3) Constant practices on auxiliary construction are recommended so that candidates would be familiar with transferring appropriate distances to locate the true shape, first auxiliary vies or other related views.

(4) Scale convection is very important in forces and frame structures and these have always been mentioned in the yearly report. E.g A given scale of 1 mm = 0.1 m with a beam of length 12 m will give a beam of length 120 mm.

(5) For the furnicular polygon: After drawing the closing line for the furnicular polygon, there is the need to draw a parallel line to it in the fore diagram to intercept the force line to determine the magnitudes of the reactions. Then convecting the distances in mm into Newtons.

5. **DETAILED COMMENTS**

QUESTION 1



The unequal pipes diameter 45 and 60 respectively intersect at 30ºas shown above. Draw, full size, the following:

(a) complete front elevation;

(b) plan;

(c) development of part q with XX as the seam.

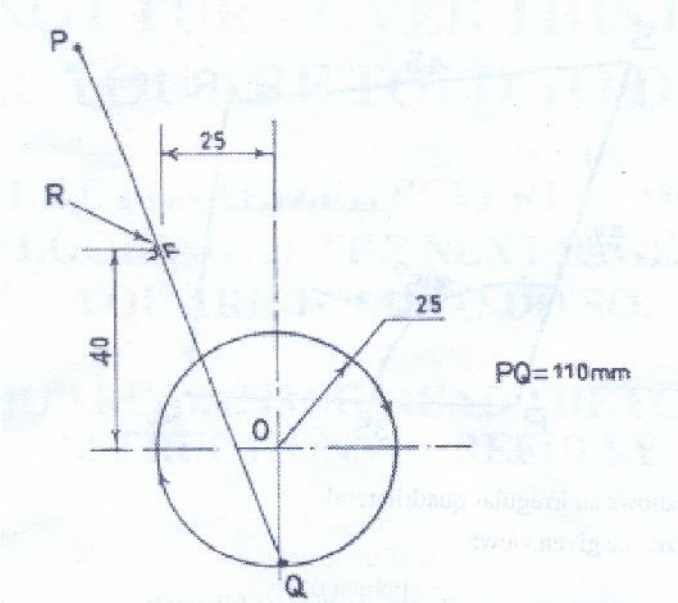
Candidates copied the given view correctly; i.e the elevation. Few realized that circles were to be drawn at the ends of the branch pipes, both in the elevation and plan. The projectors were drawn from the points on the circumferences to intercept correspondingly in order to locate points of interpenetration in the plan and elevation.

Some of the candidates did poor work in the interpenetration. Some assumed the shape as those shapes found in pipes of equal dimensions, i.e diameters. They failed to locate correspondingly the interceptions the projectors from the plan and elevation.

Few candidates developed the branch pipe perfectly while others used the longer seam for the development. Also as the interpenetration was wrongly done, the development was poorly done.

Candidates' performance was good.

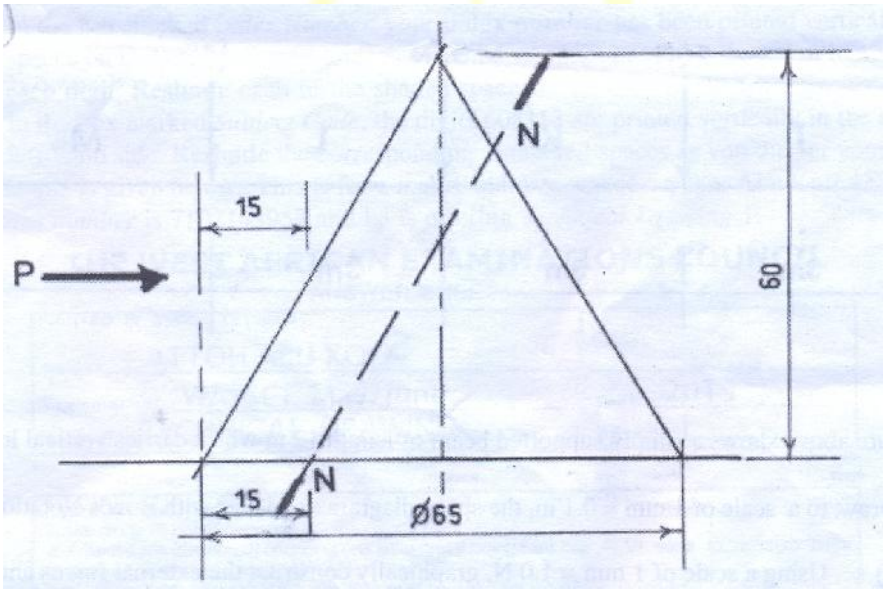
QUESTION 2



The figure above shows crank OQ which rotates in clockwise direction. The rod PQ is connected to the crank at Q and slides through the slot R.
Plot, full size, the locus of point P when the crank makes one revolution.

Majority of the candidates produced correctly the given mechanism. The circle was divided into the given mechanism. The circle was divided into twelve equal parts. Few candidates were able to draw the link; i.e rod 'QP' through the slot 'R' and managed to locate end point 'P'. But the curve through the various positions of point 'P' were not smooth.
Some of the candidates drew the link, 'QP' haphazardly, not passing through the slot 'R'. Thus the end point 'P' was poorly placed and the curve through the points 'P' was wrongly done.

QUESTION 3



The figure above shows the elevation of a cone cut by a plane NN parallel to a slant side. Draw, full size, the following views:

(a) plan;

(b) end elevation in the direction of arrow P;

(c) true shape of the cut surface.

Candidates copied the cone cut by the plane correctly. The outline of the plan was well done. Candidates divided the circle into twelve equal parts and projected up to the base of the elevation. The drawing of lines from the vase of the elevation to the apex were poorly done. Thus the cutting surface on the plan was poor.

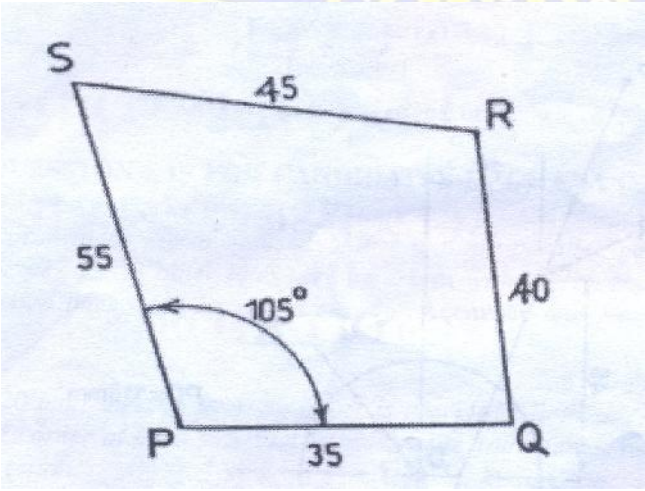
For the end elevation, i.e side view, candidates projected the horizontal lines but unable to locate their interception of line from the plan. Therefore the cutting surface was poorly produced.

Few candidates did well in the true shape while others did poor work. The reference line was wrongly drawn and candidates were unable to transfer the distance correspondingly on to the reference line.

In all some candidates correctly hatched the cut surfaces. Others did not hatched at all.

Candidates' performance was generally good.

QUESTION 4



The figure above shows an irregular quadrilateral:

(a) copy full size, the given views;

(b) (i) construct a square twice in area to the quadrilateral;

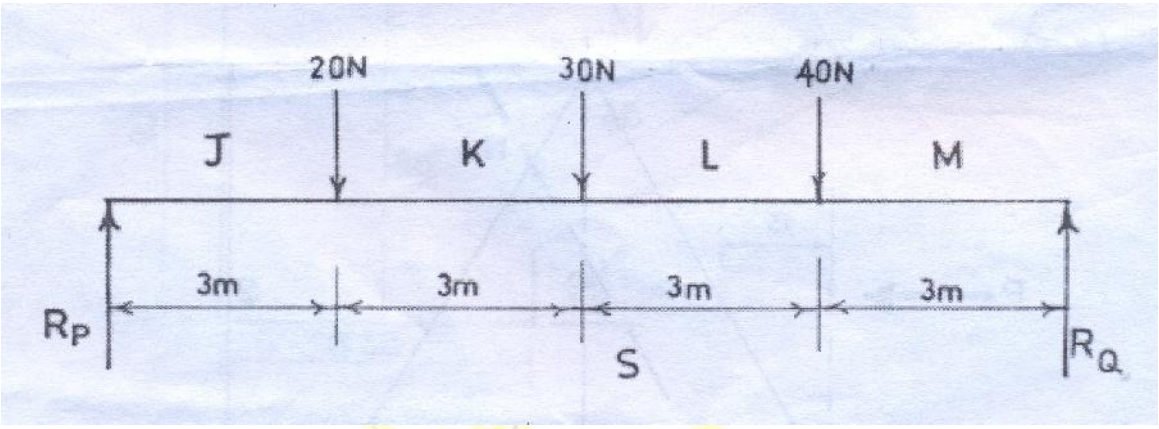
(ii) measure and state the length of the square.

This question was poorly done. The only part that was produced correctly was the given quadrilateral.

The enlargement or convertion of the quadrilateral was poorly done. Most candidates constructed the triangle but could not continue to obtain the required square. It seemed most candidates were not conversant with the required construction of the square to twice the area of the quadrilateral.

Candidates' performance was fair.

QUESTION 5



The figure above shows a simply supported beam of length 12 m which carries vertical loads.

(a) Draw, to a scale of 1 mm = 0.1 m, the space diagram and letter with Bow's Notation as indicated.

(b) (i) Using a scale of 1 mm = 1.0 N, graphically construct the external forces and the funicular polygon with a polar distance of 40 mm.

(ii) State the magnitude of the reactions R_P and R_Q.

(c) With the same scale and polar distance in (a) and (b) above, construct the bending moment diagram with a horizontal base and state the following:

(i) the scale of the bending moment diagram;

(ii) the magnitude of the maximum bending moment and its position;

(iii) the magnitude of the bending moment under the 20 N force.

The scale convertion was not well understood by most candidates. Only few candidates converted the beam 2 m to 120 m using a scale of 1 mm = 0.1 m.

The construction of the space diagram was averagely done. The placing of the forces were accurate.

The force diagram was also constructed accurately by few candidates. The polar point was placed at the correct distance from the force line.

For the furnicular polygon, the construction of parallel lines under the space diagram was well done. Most candidates constructed the closing line for the furnicular polygon but were unable to do same to obtain parallel line in the force diagram. Thus the intercepting point on the force line to determine the magnitudes of the reactions could not be done.

None of the candidates was able to construct the bending moment properly. Neither could they state the value of the maximum bending moment and the unit for the bending moment under the 20 N; i.e Unit; Newton-meter, Nm.

TECHNICAL DRAWING 3

1. GENERAL COMMENTS

The standard of the paper has not changed. The type of questions and the standard has been maintained.

The performance of candidates as compared with the previous year has been encouraging.

2. A SUMMARY OF CANDIDATES' STRENGTHS

(1) The overall performance of candidates was very encouraging in both building and mechanical.
(2) Most of the candidates sketched the spirit level.
(3) Candidates who offered the building option on the whole did very well.
(4) Candidates generally understood the assemble drawing.
(5) The draughtsmanship skills of the candidates was very good.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

(1) Most candidates used guided instruments for the free hand sketching.
(2) Most of the candidates drew claw-hammer and ball pein instead of a straight pein hammer. Identification of hand tools is a problem to most of the candidates.
(3) On the mechanical engineering option, most candidates could not assemble the parts in their appropriate places.
(4) Most candidates who offered the building option copied the sketch plan without showing the thickness of the walls, others also did not adhere to the conventional representation of the parts.
(5) There were poor layout of views. Candidates have problems with the type of lines and where they are used, most especially centre-lines, cutting planes and visible outlines.

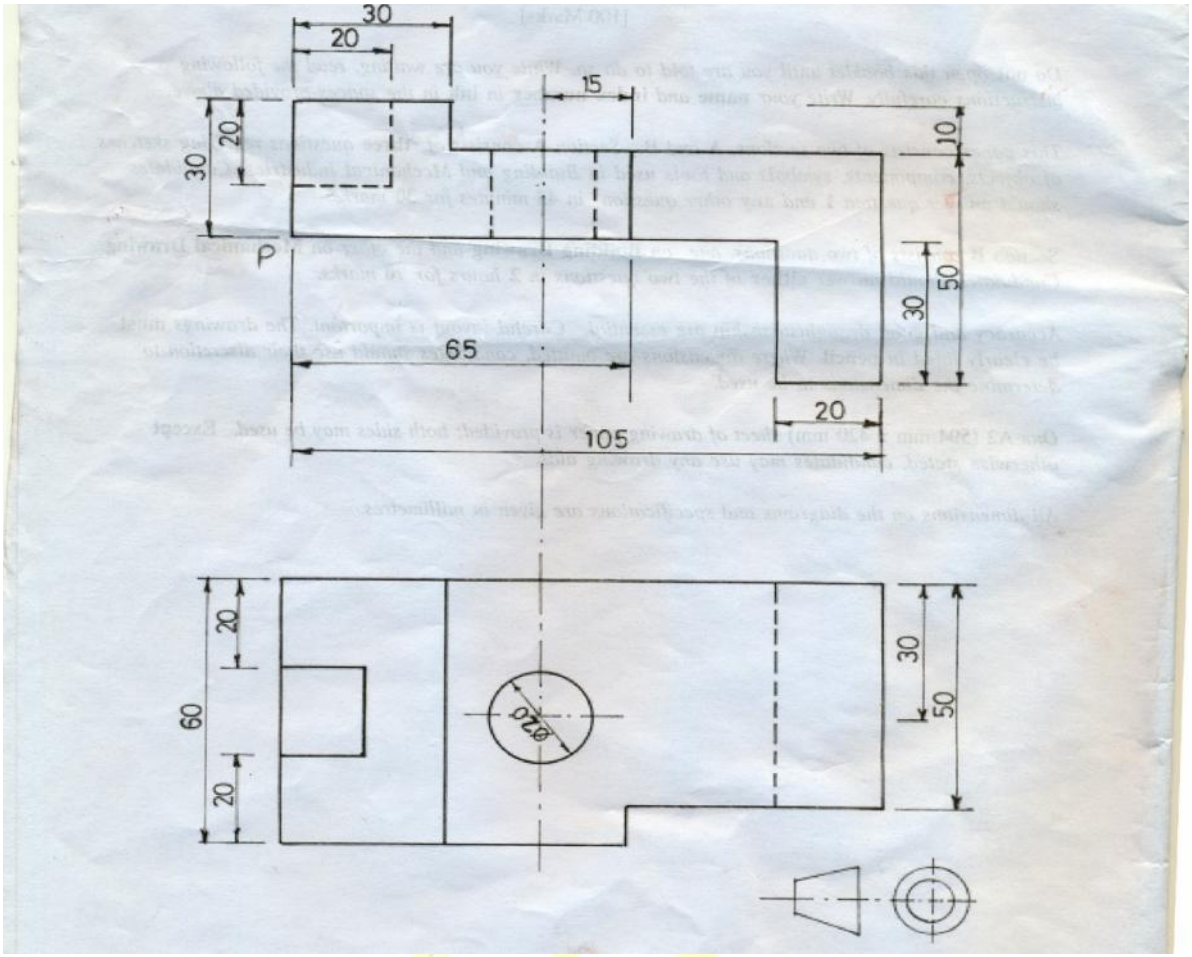
4. SUGGESTED REMEDIES

(1) Teachers are advised to give enough exercises in free hand sketching for candidates to practise and also show candidates the techniques in freehand sketching.
(2) Teachers are advised to teach their students with real objects and charts. Students should also know that sketching pictorially means sketching in three dimensional views.
(3) Assembly drawing which is a challenge to candidates can be addressed by teachers taking students to the school workshops to identify the various hand tools and to appreciate the assembling of machine components.
(4) Teachers should teach the students the building drawing conventions by using the BS 1138.
(5) Sectioning of engineering parts and components should be addressed by teachers for students to know which parts are sectioned and those which are not sectioned.

5. DETAILED COMMENTS

QUESTION 1

The figure below shows a block in first angle orthographic projection. Make a freehand isometric drawing of the block making P the lowest point.



Two views of a block were given in orthographic projection. Candidates were to make a freehand isometric sketch with 'P' as the lowest point

This question was meant to test the candidates' ability to sketch freehand without the use of any instrument, in isometric, i.e three diamensional views in one block. It requires the combination of skills in sketching rectangular objects with slots, grooves and round hole. It was a popular questions, and some of the candidates drew by using drawing instruments and again used freehand through their work to show that they have used freehand.

Some candidates who could not sketch the block, drew the three views in orthographic projection, because it was difficult to imagine how the object would look like when sketched in isometric.

Candidates' performance was generally good.

QUESTION 2

Make a neat freehand sketch of the pictorial view of a spirit level.

This question was based on sketching a pictorial view of a spirit level. Though the question look so simple to sketch, the main problem was to show the position of the liquid/indicators. Most of the candidates attempted this question but were not able to show the liquid properly. Only handful were able to show the liquid properly.

Candidates' performance was good.

QUESTION 3

Make a neat freehand sketch of the pictorial view of a straight pein hammer.

This question requires the candidates to sketch a straight pein hammer in a pictorial form. It is not a popular tool and therefore only few candidates attempted it.

Those candidates who attempted it could not sketch it well. Some sketched it in line diagram and not in the pictorial form.

Candidates' performance was poor.

QUESTION 4

A sketch plan of a twin-three bedroom bungalow was given with specification. Candidates were requested to study the specifications carefully and draw to a scale of 1:100 the following: floor plan, left side elevation and to a scale 1:50 the detailed section on Plane P-P, of the building.

This question has been a regular question. It was very well attempted. The performance was good, although few candidates could not identify the various components of the building, e.g. foundation footing, ground level, concrete floor, screed and lintel.

Most of the candidates drew the section but could not show the symbols for walls, foundation footing, concrete slab and lintel.

Candidates' performance was very good.

QUESTION 5

Detailed parts of a belt pulley unit was given in third angle projection. Candidates were requested to draw full size in first angle projection the assembly of the component of the following views: Sectional plan on a specified plane K-K and Sectional front elevation on plane P-P.

This question demanded the knowledge of functional parts in an assembly. Their positions are therefore critical. The parts will therefore be arranged in a well- accepted manner.

Most of the candidates who attempted this question did well, except that they have problem with the placement of the various views.

Candidates also have difficulty in imagining how the component will look like when cut or sectioned in a particular direction.

Lines such as centre lines, outline, sectioning lines were not drawn well. Sectioning of parts had been a problem to most of the candidates.

Candidates' performance was good.

WOODWORK 2

1. GENERAL COMMENTS

The standard of the paper was good and compared favourably with that of the previous year. The general performance of candidates was slightly better than that of the previous year.

2. A SUMMARY OF CANDIDATES' STRENGTHS

Most candidates were able to:

(1) produce neat freehand pictorial sketches;
(2) demonstrated correctly the skill of dimensioning;
(3) arrange correctly mass production activities.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

Most candidates showed weakness in the following areas:
(1) inadequate knowledge in presenting views in the Third Angle Orthographic projections;
(2) poor draughtsmanship;
(3) poor use of technical terms and jargons in candidates' responses.
(4) inability of candidates to express themselves very well to put their thoughts across.
(5) inadequate knowledge in types of solvents and their functions.

4. SUGGESTED REMEDIES

(1) Tutors should give candidates adequate exercises to improve upon their skills in sketching.
(2) Candidates should be introduced to and encouraged to use technical terms and jargons.
(3) Candidates should on their own practice the use of pencils only to do freehand sketches.
(4) Teachers should as much as possible cover all areas of the teaching syllabus to enable candidates to have a choice in selecting questions to answer.

5. DETAILED COMMENTS

QUESTION 1

(a) Arrange the following mass production activities in their sequential order of occurrence:
(i) trial assembly;
(ii) procurement of working drawings;
(iii) preparation of working;
(iv) final assembly;

(v) preparation of materials;
(vi) setting out and cutting of joints.

(b) List two types of widening joint.

(c) List two pieces of information that should be contained in a set of working drawings

(a) All the candidates attempted this question. Majority of them were able to arrange the activities in the correct sequential order, that is:

(i) preparation of working drawings;
(ii) procurement of materials;
(iii) preparation of materials;
(iv) setting out and cutting of joints;
(v) trial assembly;
(vi) final assembly.

(b) Majority of the candidates listed the two types of widening joint correctly.

(c) A few of the candidates answered this question very well. Listing the correct information such as: front elevation, end elevation, plan, scale, dimensions, date, title, etc.

QUESTION 3

(a) State two clothing habits that can cause accidents in a wood workshop.

(b) Describe how the teeth of a panel saw are set.

(c) List two wood lathe cutting tools.

(a) Most of the candidates stated general safety in the wood workshop. However, a few of them provided the correct clothing habits that can cause accidents in the workshop. For example: wearing loose clothing; wearing loose long sleeve shirt, etc.

(b) Majority of the candidates failed to describe how the teeth of a panel saw are set. They rather, described the maintenance operations involved in sharpening a saw.

(c) All the candidates answered this question. Some of the candidates however, listed general cutting tools. For example, chisel, gauge, gouge, etc, instead of: parting chisel, roughing-out gouge, facing chisel, spindle gouge, etc.

QUESTION 4

(a) Use a sectional sketch to illustrate the following holes bored when screwing:
(i) pilot hole;
(ii) clearance hole;
(vii) counterbore.

(b) (i) List two types of solvent used in the production of wood finishes.
(iii) State one function of a solvent in a wood finish.

(a) Majority of the candidates could not sketch the illustrating holes correctly. The correct sketch is shown below:

(b) (i) Most candidates listed types of wood finish instead of the required solvents used in wood finishing.

(ii) Majority of the candidates could not state correctly a function of solvent in a wood finish. However, a few candidates stated acceptable answers.

SECTION B

All dimensions are in millimeters. You should work to the main dimensions but where no dimensions are given, you should use your own discretion.

Marks will be awarded for draughtsmanship.

Answer all the questions.

A petty trader needs a showcase to be placed on a table to display snacks. The overall dimensions of the showcase are (all dimensions are in millimetres):

height - 600
width - 600

The showcase is divided into two compartments by a partition. Each of the compartments is divided into two unequal spaces by a shelf. The showcase has two glazed doors in front. It is glazed with one glass panel at the back. The sides, top and bottom are made of 18 mm plywood, and each is covered with white formica on both faces.

1. Make two preliminary freehand pictorial sketches each for a different design of the showcase.
2. Select one of the sketches in question 1 and indicate the sketch selected by a tick (√).To a scale of 1:5; draw in the Third Angle Orthographic Projection, the following views of the sketch selected:

(i) the front elevation;
(ii) the end elevation.

1. PRELIMINARY FREEHAND PICTORIAL SKETCHES

All the candidates attempted this question. About 5% of the candidates presented the required designs that showed almost the features of the showcase. In some cases candidates presented designs in line diagrams as well as making use of drawing instruments. Majority of them failed to indicate against the selected design by a tick (√) before drawing the views.

2. FRONT ELEVATION

Majority of the candidates presented the view as required in its proper quadrant. However, they failed to realize that the showcase should have glazed doors, shelves, partition, fixing fixtures and glass symbols.

Most of the candidates omitted some of the above features as specified. For example, hinges, glass symbols, and cutting plane were completely not in place.

3. SECTIONAL END ELEVATION

This view was poorly presented and wrongly place against the front elevation considering the principles of Third Angle Orthographic Projections.

Majority of the candidates failed to show the following members either in section or elevation:

- Carcase details (sides, top and bottom pieces, shelf, formica, etc.)
- Door details (top and bottom rails, stiles, glass, beads, rebates, etc)
- Back details (glass, bead, rebates, etc)

4. DRAUGHTSMANSHIP

(i) Border lines

Majority of the candidates failed to draw the border lines.

(ii) Title Block

Majority of the candidates failed to draw the title block. It is very important that candidates adhere to the basic principles as required by drawing conventions.

(iii) Layout

The two required views were drawn regardless of the rules governing Third Angle Orthographic Projections. It is large evident that candidates demonstrated lack of adequate knowledge in their presentations. Most of the views were drawn anyhow without naming them as such.

(iv) Neatness

Candidates should avoid the following weaknesses and practices for a good presentations:

- Use of dirty drawing instruments
- Use of wrong choice of pencil for a specific drawing
- Over-shading of preliminary freehand pictorial sketches
- Poor arrangement of views on the drawing paper

These weaknesses should be attended to by candidates.

WOODWORK 3

1. GENERAL COMMENTS

The standard of the paper compared favourably with that of the previous year. The performance of candidates was slightly better than that of the previous year.

2. A SUMMARY OF CANDIDATES' STRENGTHS

Most of the candidates were able to:

(1) interpret the drawing correctly;
5. mark-out correctly;
6. cut-out correctly;
7. use the right tools.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

A few of the candidates were unable to:

(1) use well sharpened and good conditioned tools;
(2) read and interpret the working drawings correctly;
(3) finish their work;
(4) tie their pieces together.

4. SUGGESTED REMEDIES

(1) Teachers should improve upon the teaching of orthographic and working drawings.
(2) Teachers should give more practical exercises which involve the reading and interpretation of working drawings.
(3) Candidates should be encouraged to sharpen their cutting tools before use.
(4) Candidates on their own should practice the steps involved in realizing an artifact.
(5) Candidates should be able to make time to finish their work.
(6) Candidates should always be reminded to tie the components of their workpeices together.
(7)

5. DETAILED COMMENTS

The work involved the following processes:

(1) Haunched mortise and tenon joint;
(2) Bridle joint;
(3) Grooves;
(4) Rebating panel;
(5) Bevelling of panel;
(6) Finishing.

(1) Haunched mortise and tenon Joints

This was attempted by most of the candidates. Most of the candidates were able to mark-out accurately and produced a fairly good joint. A few candidates however lacked the requisite skills and therefore produced a very poor work. Very few candidates produced mortise and tenon joints instead of the haunched mortise and tenon joint demanded by the question.

(2) Bridle Joint

The task asked candidates to mark-out and cut a well-fitting bridle joint. Most candidates produced the required joint. A few however could not produce well-fitting joint while very few of the candidates constructed joints other than the bridle joint required.

(3) Grooves

Candidates were required to create grooves along the sides of the two vertical members and two horizontal members to receive the panel. Most of the candidates produced a good work. A few either produced grooves which were too small or bigger than the bevel of the panel and therefore could not fit them.

(4) Beveling of Panel

The panel was to be fitted into grooves on the rails and stiles. The two ends and two sides of the panel were to be beveled to fit into the grooves. Majority of candidates were able to mark-out and prepared the bevel ends. A few however planed out the waste poorly due to the use of planes with blunt cutting edges.

(5) Finishing

Very few of the candidates were able to dress the work to give it the needed appeal. Majority of them failed to dress their work. Majority of candidates also failed to tie their components together making marking very difficult.