RÉSUMÉ OF THE REPORTS OF THE TECHNICAL SUBJECTS

1. STANDARD OF THE QUESTION PAPERS

The Chief Examiners reported that the standard of the question papers were the same as those of previous years.
A few candidates' performance was described as extremely good.

2. PERFORMANCE OF CANDIDATES

The performance of candidates according to the Chief Examiners ranged from exceptionally good to below average. They reported that many candidates in Metalwork 2, Building Construction 1 and Auto Mechanics 1 were above average but performances in Building Construction 2, Woodwork 1, Auto Mechanics 2, Technical Drawing 2 and Applied Electricity 1 were average.

3. A SUMMARY OF CANDIDATES' STRENGTHS

The Chief Examiners identified the following commendable features, among others, in candidates' work:

(1) ORDERLY PRESENTATION OF ANSWERS

It was mentioned in the reports for Metalwork 2, Auto Mechanics 1, Technical Drawing 2, Woodwork 3 and Applied Electricity 1 that candidates presented their work systematically.
The Chief Examiners were of the view that candidates for Building Construction 1 and 2, Metalwork 2 and Woodwork 3 had significant improvement in spelling and grammar as well as giving comprehensive answers.

(2) APPRECIABLE KNOWLEDGE OF THE SUBJECT MATTER

The responses provided by some of the candidates for Applied Electricity 1 and 2, Electronics 1 and Woodwork 3 indicated that they had in-depth knowledge of the subject matter. Preliminary pictorial sketches for Building Construction 1 were also very good on the whole.

(3) DEMONSTRATION OF PRACTICAL SKILLS

The Chief Examiners for Electronics 1 and Applied Electricity 1 reported that majority of candidates understood the circuit diagram principles and drew graphs accurately.

The Chief Examiner for Auto Mechanics 1 reported that many candidates were able to select tools rightly and a good number showed strength in the dismantling and assembling of engine parts.

Majority of candidates drew to the correct scale in Technical Drawing 1 differentiating between constructional lines and outlines. Candidates finished their work to specified dimensions according to the Chief Examiner for Metalwork 1 and Woodwork 2.

4. A SUMMARY OF CANDIDATES' WEAKNESSES

The Chief Examiners indicated the following weaknesses in majority of candidates' work:

(1) LACK OF IN-DEPTH UNDERSTANDING OF SUBJECT MATTER

The Chief Examiners specified in their reports that candidates in Building Construction 1, Woodwork 1 and Electronics 2 showed total lack of knowledge and understanding of questions they answered.
Candidates did not read to understand questions before giving responses.

(2) LACK OF SKILLS IN SKETCHING DIAGRAMS

It was observed by the Chief Examiners for Metalwork 2, Woodwork 3 and Technical Drawing 2 that candidates lacked the skills in freehand sketching of basic tools and designs and could not label sketches well.

(3) POOR SPELLING OF TECHNICAL TERMS AND USAGE OF EQUIPMENT

The Chief Examiners for Metalwork 2, Building Construction 2, Applied Electricity 2 and Auto Mechanics 1 reported that candidates lacked technical terms and were unable to link theory to practical.

(4) LACK OF SKILLS IN USAGE OF BASIC EQUIPMENT

The Chief Examiners reported that candidates did not know how to use basic equipment such as Cathode ray tube in Applied Electricity 2 or the hydrometer in Auto Mechanics 1.

5. SUGGESTED REMEDIES

(1) Teachers should expose candidates to a lot of sketching and spelling exercises. Naming of tools and machine parts should be taught.

(2) Candidates must do well to cover the syllabuses and relate theory to practical work to improve their understanding of the subject matter.

(3) Candidates offering subjects with practical components should attach themselves to workshops, garages and building sites.

APPLIED ELECTRICITY 1

1. GENERAL COMMENTS

The standard of the paper as a whole compared favourably with that of the previous years. Candidates' performance was generally not encouraging compared to the previous years.

2. A SUMMARY OF CANDIDATES' STRENGTHS

(1) Candidates plotted good graphs using the results obtained from the experiments.

(2) Majority of the candidates connected the circuit diagram as required by the rubrics.

3. A SUMMARY OF THE CANDIDATES' WEAKNESSES

(1) Majority of the candidates could not determine the slope of the graphs plotted.

(2) Candidates could not distinguish between milliameter and ammeter readings.

(3) Candidates showed lack of in-depth practical work.

4. SUGGESTED REMEDIES

(1) Teachers should demonstrate to students how to connect circuit diagrams.

(2) Teachers should direct candidates to read recommended textbooks on Applied Electricity to enhance their knowledge base.

(3) Candidates should do more practical work to improve their skill in soldering.

5. DETAILED COMMENTS

Candidates were provided with the following apparatus:
one 12 V d.c power supply;
one 12 V, 1 A a.c. power supply;
one d.c. voltmeter (0-12 V);
one a.c. voltmeter (0-12 V);
one d.c. ammeter (0-10 A);
one a.c. milliammeter (0-100 mA);
one decade resistance box R_b (0-200 t **)**;
one 40 W choke;
one single-pole switch;
one set of handtools;

connecting wires.

Question 1

AIM: To determine the resistance of a choke.

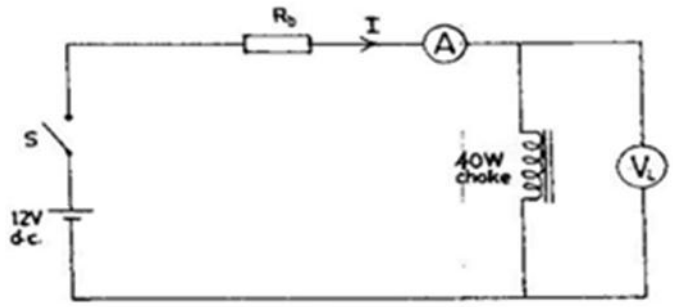


Figure 1

(a) Connect the circuit as shown in Figure 1.

(b) Ask the supervisor to check the circuit connection.

(c) Copy Table 1 into your answer booklet.

Table 1

R_b(t)	I (A)	V_L (V)
0		
10		
20		
30		
40		
50		
60		
70		

(d) Close switch S.

(e) **Read and record in Table 1 the readings on the ammeter A and voltmeter V_L.**

(f) **Open switch S.**

(g) **Increase the resistance value of R_b in steps of 10 t .**

(h) **Repeat steps (d) to (g) for up to 70 t as shown in Table 1.**

(i) **Plot a graph of voltage V_L (V) on the vertical axis against current I (A) on the horizontal axis.**

(j) **Determine the gradient of the graph.**

In experiment 1, candidates were to increase a decade resistance box in steps of 10 ohms and record the ammeter and load voltage readings respectively with respect to a 40 watts choke.

Majority of candidates had the correct values for the load voltage, but few could not read accurately the Ammeter readings.

Candidates plotted good graphs of the values obtained but could not determine the gradient of the graph. Candidates' performance was fair.

Question 2

AIM: To determine the reactance of a choke.

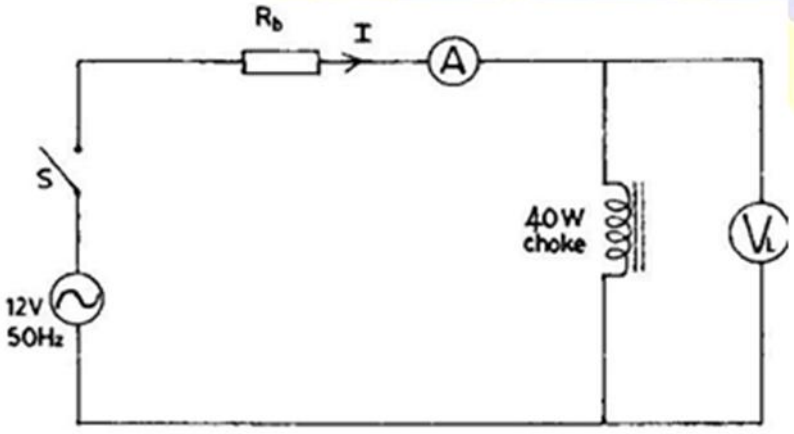


Figure 2

(a) **Connect the circuit as shown in Figure 2.**

(b) **Ask the supervisor to check the circuit connection.**

(c) **Copy Table 2 into your answer booklet.**

Table 2

R_b(t)	I (mA)	V_L (V)
0		
10		
20		
30		
40		
50		
60		
70		

(d) Close switch S.

(e) Read and record in Table 2 the readings on the milliammeter A and voltmeter V_L.

(f) Open switch S.

(g) Increase the resistance value of R_b in steps of 10 t .

(h) Repeat steps (d) to (g) for up to 70 t as shown in Table 2.

(i) Plot a graph of voltage V_L (V) on the vertical axis against current I (mA) on the horizontal axis.

(j) Determine the gradient of the graph.

(k) Comment on the gradient of the two graphs.

Majority of the candidates performed the experiment with ease. Few candidates could not read the current in milliampers as required by the rubrics, instead they read in ampers, making the readings much bigger than required.

Few candidates did not disconnect the 12 V d.c. power source used in experiment 1, but rather continued using it in experiment 2

Candidates' performance was good.

APPLIED ELECTRICITY 2

1. GENERAL COMMENTS

The standard of the paper was comparable to that of the previous years.
Candidates' performance compared with the previous years was generally poor.

2. A SUMMARY OF CANDIDATES' STRENGTHS

(1) Majority of the candidates were able to distinguish amplitude modulation from frequency modulation.

(2) Most of the candidates responded to questions involving calculations.

(3) Most candidates understood the principle of earthing in electrical installation.

(4) Candidates differentiated between class A and class B amplifiers in terms of their biasing conditions.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

(1) Candidates could not explain simple electrical terms.

(2) Candidates lacked the skill in the usage of the cathode-ray-tube.

(3) Most candidates could not define distortion with respect to power amplifiers.

4. SUGGESTED REMEDIES

(1) Candidates should be encouraged to carry out more class assignments to build their knowledge base.
(2) Teachers should be more resourceful and improvise materials and instruments for more practical activities.
(3) Candidates should read more textbooks and literature on Applied Electricity to improve their knowledge base.

5. DETAILED COMMENTS

Question 1

(a) Define power factor in terms of electrical power.

(b) State two effects of low power factor in an electrical installation.

(c) A radio receiver draws 2.0 A at 240 V. If the set is used for 6 hours per day, calculate the:
(i) power consumed;
(ii) energy consumed in a week.

Majority of the candidates attempted this question. The difficulty encountered by most of the candidates was found in the calculation of the power factor and the effects of low power factor. Some effects of low power factor are: High tariff, a generator should supply more current for a given amount of load, and distortion system would have greater power losses in the resistance of distribution lines. Candidates' performance was fair.

Question 2

(a) Define self-induction with respect to the electromagnetic induction.

(b) A solenoid of length 30 cm and a cross-sectional area of 4×10^{-4} m^2 contains 400 turns. Calculate, for the solenoid, the:

(i) inductance;

(ii) self-induced e.m.f. if the current decreases at the rate of 50 A/s.

(Take « = 4® x 10^{-7} H/m)

Most candidates could not define self-induction with respect to electromagnetic induction. Self-induction is a phenomenon whereby an e.m.f. and current induced in a coil is cut by a magnetic flux in the same coil.

Few candidates used the correct formulae in calculating the inductance and self-induced e.m.f. and had the solution correct. Candidates' performance was poor.

Question 3

(a) Explain each of the following:

(i) earthing;

(ii) protective earthing conductor

.

(b) List two protective devices used in an electrical installation.

(c) State two advantages of HBC fuse over rewirable fuse.

Most candidates who attempted this question performed very well. Candidates explained earthing and protective earthing conductors perfectly, listed the two protective devices used in an electrical installation, but could not state the two advantages of HBC fuse over rewirable fuse.HBC fuses have high speed of operation and do not deteriorate with age, etc.

Candidates' performance was generally very good.

Question 4

Explain how a cathode ray oscilloscope can be used to determine the

(a) frequency of a waveform;

(b) peak voltage of a waveform.

Most candidates did not understand the demands of this question and therefore wrote irrelevant facts not demanded by the rubrics.

The appropriate response is: Having fulfilled all the operational instructions with the sinusoidal waveform displayed on the CRO, the Knob settings are noted.

The time to complete one cycle is obtained, the frequency of the waveform is the reciprocal of the time period. The peak voltage is obtained when the waveform is symmetrical along the axis hence the maximum voltage.
Candidates' performance was poor.

Question 5

(a) Define distortion with respect to power amplifiers.

(b) State two methods of preventing distortion in power amplifiers.

(c) State the difference between class A and class B power amplifiers in terms of:
(i) biasing;
(ii) power output.

Majority of the candidates poorly responded to this question.
Distortion in a power amplifier occurs when the output signal is not identical to the input signal, hence limiting the power available.
Two methods of preventing distortion in power amplifiers are:
(i) operate amplifier at reduced power level;
(ii) linearization.

Most candidates stated the difference between class A and class B power amplifiers in terms of biasing and power output. Candidates' performance was poor.

Question 6

(a) Classify the following as AM or FM stations based on the frequency:

Frequency	**Classification**
103.5 MHz	
80 kHz	
100.5 kHz	

(b) Describe how doping of a semiconductor changes its electrical properties.

(c) Explain the significance of drawing a d.c. loadline on output characteristics of an audio frequency amplifier.

This was a well attempted question by majority of the candidates. Candidates classified amplitude modulation and frequency modulation under the given frequencies.

Majority of the candidates described appropriately how doping of a semiconductor changes its electrical properties, but could not answer properly the significance of drawing a d.c. loadline. A loadline shows all the possible operating points when different values of base current are applied. Candidates' performance was generally fair.

AUTO MECHANICS 1

1. GENERAL COMMENTS

The standard of this year's paper compares favourably with that of the previous years. The performance of students was generally above average although some of them had to struggle to answer oral questions posed by examiners.

2. A SUMMARY OF CANDIDATES' STRENGTHS

(1) A good number of candidates exhibited some strength in the dismantling and refitting of the clutch.

(2) Some candidates were able to use the right tools to get the required voltage of the battery.

(3) Candidates were able to select their tools rightly.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

(1) Majority of candidates could not interpret the reading of the hydrometer.

(2) Candidates could not handle and use tools and equipment well.

(3) Identification and naming of parts were poorly done.

4. SUGGESTED REMEDIES

(1) There is the need for a reasonable time for practice in school workshops.

(2) Dismantling and assembling of components should form part of the identification exercise where students should be taught names of component parts.

(3) Names of tools and equipment used in any task should be taught by instructors.

5. DETAILED COMMENTS

Question 1

From the engine provided:

(a) remove the clutch assembly Report to the Examiner;

(b) identify four parts of the clutch indicated by the Examiner;

(c) examine the condition of

(i) friction disc;
(ii) pressure plate.
Report to the Examiner;

(d) refit the clutch.
Report to the Examiner;

(e) Answer two relevant oral questions from the Examiner;

(f) Safety, selection and handling of tools

In this question, candidates were required to demonstrate the following skills:
- removal of a clutch assembly;
- arrangement of the parts on a working bench;
- identify four parts of the clutch;
- examining the condition of the friction disc;
- take note of the surface of the pressure plate if there is any carbon deposit;
- use dummy bar for refitting of the clutch;
- select the correct tools for dismantling and assembling of the clutch.

Quite a good number of candidates were able to remove the clutch assembly although many of them wasted time in selecting the right tool.

Many candidates did not have any knowledge on the parts of the clutch.

Candidates found it a big challenge reporting on the condition of the friction disc and pressure plate.
Refitting of the clutch was not an easy task for some of the candidates.
The selection of tools was largely a trial and error affair, with so much time wasted.

Question 2

On the battery provided:
(a) clean the terminals.
Report to the Examiner;

(b) examine the external condition of the battery.
Report to the Examiner;

(c) check the state of charge of the battery.
Report to the Examiner;

(d) check the voltage of the battery.
Report to the Examiner;

(e) answer two relevant oral questions from the Examiner.

(f) safety, selection and handling of tools.

In this question, candidates were required to demonstrate the following skills:
- cleaning the battery terminals with the right tool;
- examining the external condition of the battery;
- checking the state of the charge with a hydrometer;
- using the voltmeter/multitester to check the battery voltage.

Most candidates used rag to clean the battery. Examining the external condition of the battery was a problem for majority of candidates who either did not comprehend the word 'external' and considered things within the battery or were only looking for dirt on the casing.

Only few could use the multitester provided to check the battery voltage although most candidates were able to identify the positive and negative terminals using the correct means of identifying them.
Candidates' performance was fair.

AUTO MECHANICS 2

1. GENERAL COMMENTS

The standard of the paper was of the same level as those of previous years.
The rubrics were clear and straightforward.
Candidates' performance was generally below that of the previous year.

2. A SUMMARY OF CANDIDATES' STRENGTHS

(1) Generally, candidates answered question four very well.

(2) Candidates were able to label some diagrams very well.

(3) Candidates adhered to the rubrics of the examination.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

Weaknesses displayed by candidates detected by the Chief Examiner included the following:

(1) Poor presentation of sketches and diagrams.

(2) Poor expression of ideas on paper.

(3) Lack of knowledge of the subject matter.

(4) Poor spelling of technical terms.

4. SUGGESTED REMEDIES

(1) Candidates should practice drawing of components as often as possible.

(2) Teachers should teach students how to present answers to examination questions

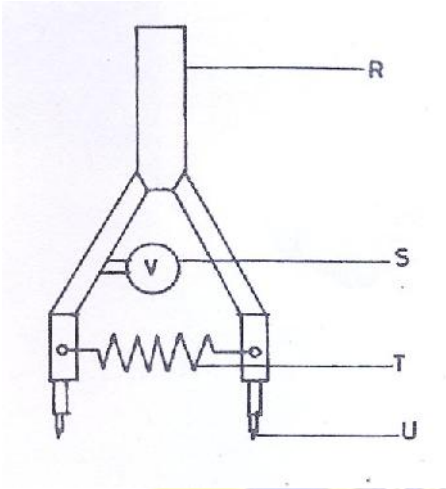
(3) Candidates should prepare adequately for the examination by reading more Auto Mechanics books to acquire knowledge on the subject matter.

(4) Teachers should engage candidates in more practical work to improve their knowledge and make sketching easier for candidates.

5. DETAILED COMMENTS

Question 1

The sketch below shows an electrical instrument.



(a) (i) Identify the instrument.
(ii) Identify the parts labelled R, S, T and X.

(b) State three safety precautions that should be observed when preparing an electrolyte.

(c) Explain the rating of a battery capacity as 80 amperes/hours at 10 hours.

(a) (i) The identification of the instrument shown in the sketch was wrongly done by most candidates as a voltmeter, a galvanometer or as a discharger. The instrument as shown is a high rate discharge tester.

(ii) Some candidates could not identify the parts of the sketch. Among those which were incorrectly identified included **U** which many candidates identified as terminals and **T** which was wrongly named by many candidates as a spring. The correct identification expected by the examiner is **R** - Insulated Handle, **S** -Voltmeter, **T** - Heavy Load Resistance or Resistance Strip, **U** - Test prods/Prongs.

(b) A good number of candidates did well in this question.

(c) This question was the most badly answered. A lot of ignorance was displayed by candidates.
The capacity of a battery is its ability to supply a steady current of 8 Amperes for at least 10 hours before its cell voltage falls below a range of 1.5 to 1.8 volts.

Question 2

(a) Use sketches to illustrate the operations of the 4-stroke cycle diesel engine.

(b) Describe the operation of the power stroke.

(c) Explain why pre-ignition does not occur in the compression ignition engine.

(d) What ignites the fuel in a compression ignition engine?

(a) Sketches produced by candidates could be described as not workable. For example pistons were sketched far away from the cylinder walls. Valves were just drawn anywhere not showing whether a valve is opened or closed. A few candidates produced good sketches and earned good marks.

(b) The description of the operation of the powerstroke was well answered by a few candidates while majority could not. Most wrote that "at the end of the powerstroke fuel and air mixture is ignited by the spark plug". Rather, the injector is a device which sprays fuel into the hot compressed air at the end of the compression stroke.

(c) Funny answers were given to this question. Pre-ignition does not occur in the compression ignition engine because in the compression ignition engine, it is only air that is compressed during the compression stroke and air alone is not ignitable.

(d) In this question, many candidates mistakenly thought it is the injector.

Question 3

(a) Use sketches to illustrate the following:
(i) castor angle;
(ii) camber angle.

(b) State the importance of camber angle.

(c) Explain the conditions necessary for true rolling motion of the front wheels on a motor vehicle.

(d) State two effects of incorrect toe-in.

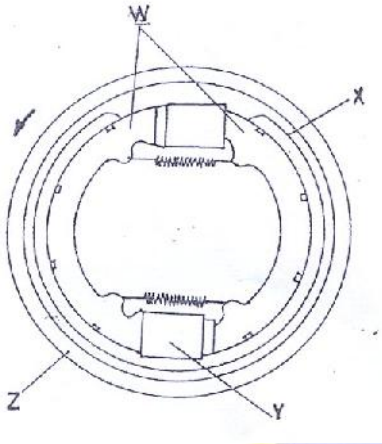
(a) A good number of the candidates produced good sketches with the castor angle whilst majority could not sketch camber angle properly.

(b) Majority of the candidates could not give the importance of the camber angle.
The provision of the camber angle is to:
(i) help achieve centre point steering;
(ii) enable steered wheels to swivel easily.
(iii) give light and easy steering.

(c) A lot of candidates showed ignorance while a few gave excellent answers on the right conditions necessary for true rolling motion of the wheels on a motor vehicle.

(d) Candidates did fairly well in this question.

Question 4



(a) Identify the type of brake arrangement shown above.

(b) Name the parts labelled W, X, Y and Z.

(c) (i) Name the material for making brake lining.
(ii) State two reasons for the choice of the material.

(d) State two causes of a spongy brake pedal.

This was the most well answered question.

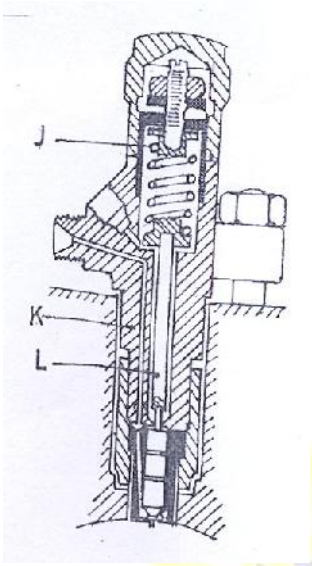
(a) Candidates were able to identify the sketch.

(b) The labelling was well done to conform to the expected answers.

(c) Candidates responses were very good. Some of the answers given for the choice of material included Heat resistance, cheaper to produce, ability to produce friction among others.

(d) This part of the question was also well answered.
Candidates gave swollen master cylinder, losened master seal and loosened master cylinder and hacknuts as some causes of spongy brake pedal.

Question 5



(a) (i) Identify the component shown in the sketch above.
(ii) State the function of the component.
(iii) Name the parts labelled J, K and L.

(b) Sketch the road signs to show the following:
(i) pedestrian crossing;
(ii) T-junction;

(c) State the function of the following units in a vehicle air conditioning system:
(i) compressor;
(ii) evaporator.

(a) (i) It was a well answered question, with a very small number showing lack of knowledge.

(ii) Again, a good number of candidates displayed knowledge of the function of an injector V_{12}. It breaks up the fuel to the required degree and sprays it into the compressed air.

(iii) The part that gave problems to candidates in labelling the component was K - the nozzle holder which they wrongly identified as 'body'.

(b) Candidates attempted this part of the question with various degrees of accuracy and marks were awarded accordingly.

(c) Some candidates did well with the functions of the units in the air conditioning system, others did not. The function of the compressor is to raise the pressure and temperature of the vapourised refrigerant. The evaporator extracts heat from the passenger compartment and uses the heat to vaporize the refrigerant.

BUILDING CONSTRUCTION 1

1. GENERAL COMMENTS

The paper was well composed and gave out clear information to the candidates. The topics were selected based on the syllabus.
The standard of the paper was extremely good. The performance of candidates was seen to be average, however, there were some candidates who performed much better than what can be described as usual.

2. A SUMMARY OF CANDIDATES' STRENGTHS

(1) Some candidates produced good and remarkable sketches which were explanatory enough. Others arranged their thoughts in a meaningful manner.

(2) Candidates were able to identify elements on the drawing and were able to label correctly sketches they produced.

(3) Most candidates produced legible handwritings which were easy to read.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

(1) Some candidates could not use correct symbols in their sketches to explain ideas.

(2) Some candidates could not read and understand the questions well.

(3) A few candidates did not prepare well for the examination as they answered less questions than they were asked to do.

4. SUGGESTED REMEDIES

(1) Candidates should prepare very well or make conscious efforts to cover the topics making up the syllabus.

(2) Candidates should relate the theory they study in the classroom to sitework for perfect understanding of the subject.

(3) Candidates should constantly practice how to answer questions.

5. DETAILED COMMENTS

Question 1

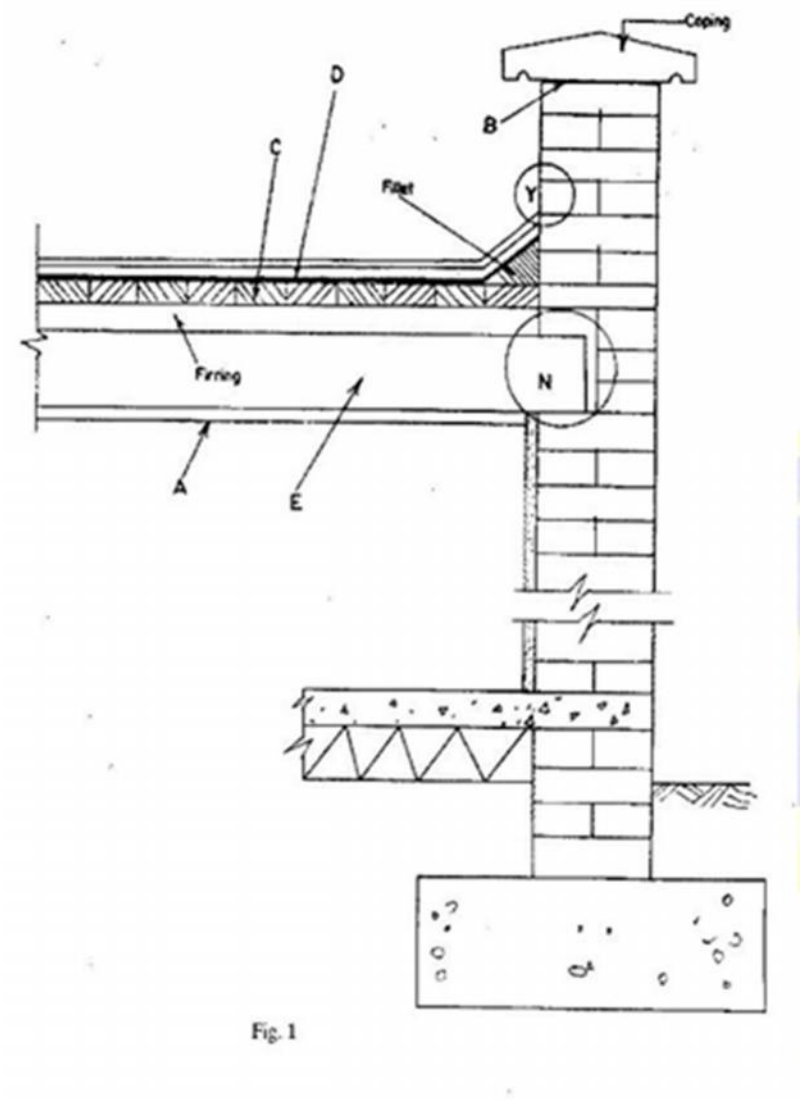


Fig. 1

(a) Identify the elements labelled A, B, C, D and E.

(b) State one function of each of the following elements:

(i) coping;

(ii) filet;

(iii) firing piece.

(c) With the aid of a sketch, describe the treatment to:

(i) the roof surface to reduce the absorption of heat from the sun;

(ii) be applied at the junction between the flat roof and the parapet wall to prevent entry of rainwater into the building.

(d) State three methods that can be used to prevent decay of the timber element in the portion labelled N.

(e) The ground floor of the building is 150 mm thick concrete on a hardcore filing. The floor is finished with tongue and groove wooden strips nailed to battens embedded in the concrete. Sketch a cross section through the external wall from foundation to the ground floor level.

(f) Label the following parts in the sketch in (e):

(i) ground floor slab;

(ii) embedded battern;

(iii) tongue and groove flooring;

(iv) skirting board

(a) Some candidates interchanged the position of the elements which showed that they did not understand the drawing.

(b) Reasonable answers were given to the first element by most of the candidates.
The responses to the second and third elements were not good. the correct answers are fillet and firring piece respectively. Some did not know why those elements are introduced in building construction.

(c)(i) &(ii) Most candidates could not answer these questions correctly. Candidates were expected to copy the sketch in the question and introduce a layer of reflective chippings on top of the flat roof to reflect the heat into the building. At the junction between the flat roof and the wall, the solution was an introduction of lashing plate embedded in the brick joint of the wall and laid over the roofing materials to throw off water to the surface of the roof.

(d) Most candidates stated the painting method which is coating the timber surfaces with sealant to prevent the timber from absorbing moisture.
Only a few candidates mentioned the other methods which include:

(1) Provision of damp-proof material under the sleeper.

(2) Provision of sleeper/shoe to raise the element 'N' from its bearing.

(3) Provision of adequate ventilation in the area of the timber to avoid dampness.

(e)&(f) Most candidates provided good responses with the needed information.

Question 2

(a) State four functional requirements of a mortar for laying a sandcrete blockwall.

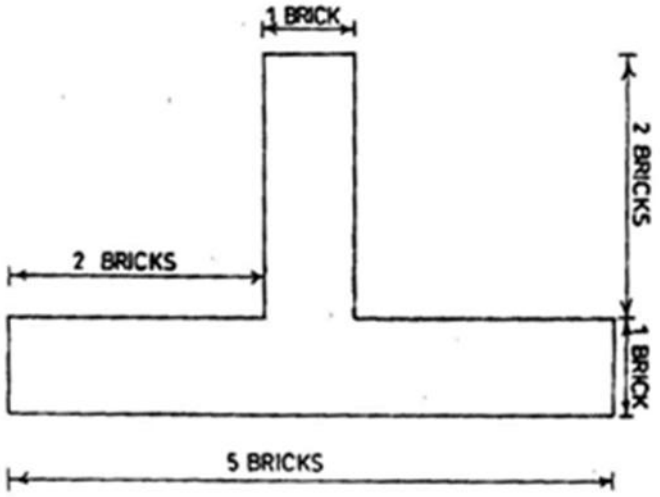


Fig. 2

(b) Fig. 2 shows the plan of the outline of a brickwall.
Sketch the:
(i) plans of the alternate courses in English bond;
(ii) front elevation of three courses of the wall.

(c) Sketch a barrel bolt and label the following parts:
(i) staple;
(ii) bolt;
(iii) barrel;
(iv) plate.

(a) Some candidates gave answers which were for hardened mortar instead of fresh mortar. The required answers include:
(1) must have good workability.
(2) must have adequate strength.
(3) must be durable.

(b) Most candidates gave disappointing responses. Most of the respondents to this question did not introduce queen closers in the wall to avoid straight joints. Some also did not know that two headers make the length of a stretcher.

(c) Majority of candidates produced reasonable sketches to answer the question.

Question 3

(a) Explain two methods of destroying termites on a building site.

(b) Explain four factors that may lead to the collapse of the sides of trench excavation.

(c) State two reasons for using a site square in a setting out operation.

(a) Candidates stated the two methods which the question required in destroying termites on a building site.

(b) Good answers were given by candidates. They stated the issue of goats, sheep, etc. getting to building sites to disturb timbering erected on sites.

(c) Most candidates gave the right answers to this question.

Question 4

(a) State two precautions to be taken when storing each of the following building materials on site:
- **(i) bagged cement;**
- **(ii) sawn timber;**
- **(iii) fine aggregates;**
- **(iv) coarse aggregates.**

(b) State four pieces of information that must accompany the application to a water company for a pipe water supply to a building site.

(c) Explain three precautions to be taken when locating and installing a ventilation pipe in a drainage scheme.

(a) Different views were expressed to indicate that candidates were aware of the measures to be taken when storing building materials on a site.

(b) Candidates could not answer this question well. The required answers include:
- (a) Site layout plan of the project.
- (b) Nature of access road to the site.
- (c) The name of the owner of the property.
- (d) The type of structure to be erected.

(c) Candidates gave precautions when laying a drain pipe instead of precautions when locating and installing a ventilation pipe in a drainage scheme.

Question 5

(a) Explain with sketches three methods of protecting the walls and base of a mud building against rainwater erosion.

(b) State three reasons for tiling the walls of a kitchen.

(c) Explain the following terms in relation to drainage:
- **(i) invert level;**
- **(ii) soil pipe;**
- **(iii) gully.**

(d) State the purpose of a trap in a drainage system.

(a) Candidates did well with written explanations than with the sketches. Some sketches showing the use of apron, open drain and render to protect the walls and base of the building against water erosion were not properly sketched.

(b) & (c) Deserving answers were given to the questions by candidates.

(d) Candidates could not give the right answers to this question. The correct answer is that the trap is used to retain water in the drainage system to prevent foul gas from escaping into the building or the atmosphere.

Question 6

(a) Describe the use of each of the following in relation to earthworks:
- **(i) mechanical shovel;**
- **(ii) tipper truck;**
- **(iii) mechanical auger.**

(b) Explain three desirable qualities of coarse aggregates for concrete production.

(c) Sketch to show how subsoil moisture is prevented from damaging the floor finishes and the walls above the ground slab.

(a)&(b) Most candidates gave good answers to these questions.

(c) Candidates made good sketches to show how subsoil moisture is prevented from damaging the floor finishes and the wall above the ground slab. Some candidates however did not position some of the elements correctly. Example - d.p.c was placed as d.p.m.; blinding was placed on the ground slab or below the hardcore fill.

BUILDING CONSTRUCTION 2

1. GENERAL COMMENTS

The standard of the paper and the performance of the candidates was not any different from that of the previous years.
The questions were appropriate for the candidates' level and within the scope of the syllabus.

2. A SUMMARY OF CANDIDATES' STRENGTHS

A good number of the candidates showed good knowledge and understanding of the subject matter. Most candidates were able to give comprehensive answers to the questions. There were significant improvement in candidates' grammar and spellings as compared to that of the previous years.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

(a) Inadequate preparation of candidates towards the examination.

(b) Candidates could not express themselves well in the trade (subject) jargons or terminologies.

(c) Lack of practical knowledge on the part of candidates as they are unable to link theory to practicals in their answers.

4. SUGGESTED REMEDIES

(a) Candidates should be helped to improve upon their reading skills, spellings and basic sentence construction.

(b) Tutors should expose candidates to practical lessons by visiting sites and link theory to practise.

(c) Schools should ensure that candidates are taken through thorough preparations such as total coverage of syllabus before they sit for their final examinations.

5. DETAILED COMMENTS

Question 1

(a) Explain two reasons for washing pit sand for concrete work.

(b) Sketch a section through a formwork for a beam and label the following features:
(i) prop;
(ii) head tree;

(iii) brace;
(iv) soffit board;
(v) sole plate;
(vi) cleat;
(vii) folding wedges.

(a) Majority of candidates provided the right answers.

(b) Most of the candidates produced well labelled sketches as demanded by the question.

Question 2

(a) State four functions of an external wall.

(b) Sketch a section through a timber flat roof with a parapet wall and label the following features:
(i) damp proof course;
(ii) boarding;
(iii) felt roof;
(iv) eaves gutter;
(v) throating;
(vi) concrete coping;
(vii) parapet wall;
(viii) flashing.

(a) Most of the candidates were not able to produce encouraging answers to this question. The required answers include:
- resists damp penetration;
- provides adequate thermal insulation;
- encloses space;
- offers adequate resistance to fire;
- accommodates doors and windows.

(b) Majority of candidates who attempted this question could not provide a good sketch to this question.

Question 3

(a) State the function of a staircase.

(b) Sketch a section through a three step timber staircase and label the following:
(i) string;
(ii) tread;
(iii) riser;
(iv) nosing.

(c) State three functions of a window.

(a) Most candidates provided very good and meaningful answers to this question.

(b) Majority of candidates produced good sketches, however a few of them sketched concrete staircase instead of timber staircase.

(c) Candidates gave good answers to this question.

Question 4

(a) State two reasons why it is necessary to remove vegetable soil from a building site.

(b) With the aid of sketches, describe two methods of preventing the sides of a foundation trench in a clayey soil from collapse.

(c) State four functional requirements of a damp proof course in a wall.

(a) Candidates who answered this question were able to give good answers to it.

(b) Majority of candidates provided good sketches to answer the question.

(c) A few candidates were able to give the required answers. The answers include:
- it must be resilient and durable;
- ability to withstand heat;
- should be able to withstand load and penetration;
- should be able to withstand shear and moisture penetration.

Question 5

(a) State the colour code for each of the following electrical wires:
(i) neutral;
(ii) live;
(iii) earth;

(b) Sketch a section through a bath tub and label the following parts:
(i) overflow;
(ii) trap;
(iii) waste pipe;

(c) (i) List three domestic sanitary fittings.
(ii) State one use of each of the sanitary fittings listed in (c)(i).

(a) Most of the candidates mixed up the colours. The required answers are:
(i) Neutral - black or blue
(ii) Live - red or brown

(iii) Earth - green or yellow/combined green and yellow

(b) Most of the candidates presented good sketches.

(c) Majority of candidates identified domestic sanitary fittings and stated their uses.

ELECTRONICS 1

1. GENERAL COMMENTS

The standard of the paper compared favourably with that of the previous year.
The general performance of candidates was at par when compared to the previous year.

2. A SUMMARY OF CANDIDATES' STRENGTHS

(1) Majority of the candidates understood the circuit diagram.

(2) Candidates attempted all the two questions and completed the experiments.

(3) Majority of the candidates drew good graphs from the values obtained from the experiments.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

(1) Most candidates wasted time by providing irrelevant information not demanded by the rubrics.

(2) Candidates lacked the technique in the calibration of milliameters.

(3) Candidates had dried joints thereby getting wrong values for some of the values required by the rubrics.

4. SUGGESTED REMEDIES

(1) Candidates should practise the use and care of measuring instruments.

(2) Teachers should teach candidates how to select accurate ranges and the technique of instrument calibration.

(3) Candidates should be exposed to more laboratory work to improve upon their skill in practical activities.

5. DETAILED COMMENTS

Candidates were provided with the following apparatus:
one d.c. power supply (0-12 V);
one d.c. milliammeter (0-100 mA);
three 10 t , ¼ W resistors; (R_1, R_2, R_3);
three 33 t , ¼ W resistors; (R_4, R_5, R_6);
one toggle switch;
one soldering iron with resin-cored solder;
Veroboard/Quick test board;
Connecting wires;
Long nose plier;
Side cutter.

Question 1

AIM: The aim of both experiments is to determine the equivalent resistance of a circuit.

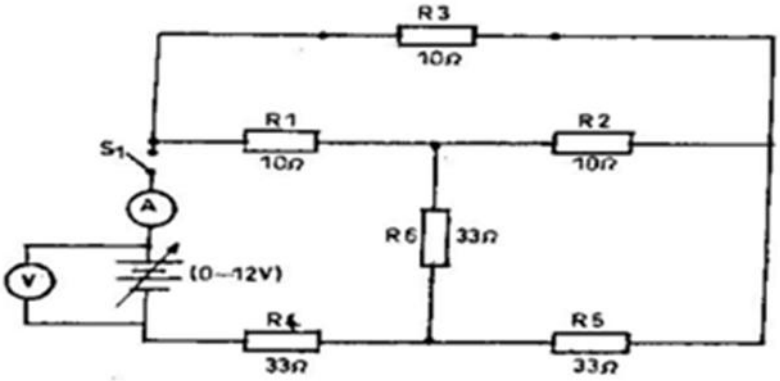


Figure 1

(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

Voltmeter reading (V)	Ammeter reading (mA)
3.0	
4.0	
6.0	
8.0	
9.0	
12.0	

(d) Close switch S_1.

(e) **Adjust the power supply to obtain a reading of 3V.**

(f) **Read and record the readings of the ammeter and voltmeter as in Table 1.**

(g) **Repeat steps (e) and (f) for the other voltage values in Table 1.**

(h) **Plot a graph of voltage (V) on the y-axis against current (I) on the x-axis.**

(i) **Determine the slope (L_1) of the graph.**

(j) **State the equivalent resistance of the circuit.**

Experiment 1 tested the equipment resistance between resistor (R_1) and resistor (R_4) of the circuit.
Majority of the candidates obtained good results and were able to plot accurate graphs.
Candidates could not determine the slope of the graph properly as a result of the linear line not passing through the points of best fit.

Majority of the candidates were able to state the equivalent resistance of the circuit.
Candidates' performance was generally fair.

Question 2

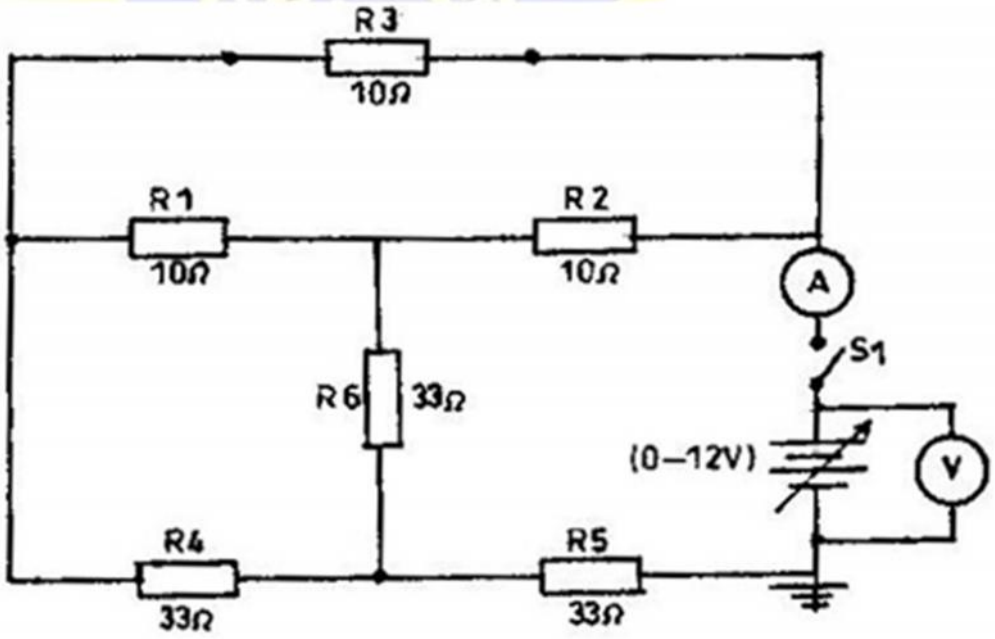


Figure 2

(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.

Voltmeter reading (V)	Ammeter reading (mA)
3.0	
4.5	
6.0	
7.5	
9.0	
12.0	

(d) Close switch S_1.

(e) Adjust the power supply to obtain a reading of 3V.

(f) Read and record the readings of the ammeter and voltmeter as in Table 2.

(g) Repeat steps (e) and (f) for the other voltage values in Table 2.

(h) Plot a graph of voltage (V) on the y-axis against current (I) on the x-axis.

(i) Determine the slope (L_2) of the graph.

(j) Evaluate: $100\left(1-\frac{L1}{L2}\right)\%$

Experiment 2 tested the equivalent resistance between resistor (R_1) and resistor (R_5) of the circuit diagram.

Majority of the candidates could not interpret the fact that the two experiments have the same equivalent resistance.

Majority of the candidates also failed to obtain zero (0) percent for the evaluation of $100\left(1-\frac{L1}{L2}\right)\%$, however few candidates were able to draw very good graphs from the results they obtained.

Candidates' performance was fair.

ELECTRONICS 2

1. GENERAL COMMENTS

The standard of the paper compared favourably with that of the previous year.

2. A SUMMARY OF CANDIDATES' STRENGTHS

(1) Majority of the candidates were able to recall formulae precisely.
(2) Majority of the candidates had an in-depth knowledge of series resonant circuits.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

(1) Most of the candidates' responses were disjointed. They could not bring their acquired knowledge in the subject to bear.
(2) Candidates produced responses that did not reflect the demands of the rubrics.

4. SUGGESTED REMEDIES

(1) Teachers should emphasize the fact that schematic diagrams are not required when responding to questions that involve circuit diagrams.
(2) Candidates should read thoroughly the demands of the rubrics before attempting questions.
(3) Candidates should broaden their knowledge in Electronics by reading more textbooks and periodicals.

5. DETAILED COMMENTS

Question 1

(a) Sketch and label the circuit symbol for each of the following devices:
(i) n-channel junction field effect transistor;

(ii) thyristor;

(iii) triac.

(b) State one application each for the devices in (a).

(a) and (b) Few of the candidates drew the circuit symbols of the thyristor and triac, but could not draw the n-channel junction field effect transistor.
Majority of the candidates were able to state the applications of the thyristor and triac.

Candidates' performance was fair.

Question 2

(a) Define the following with respect to alternating current circuits:
(i) reactance;
(ii) impedance.

(b) Figure 3 is a series resonance circuit.

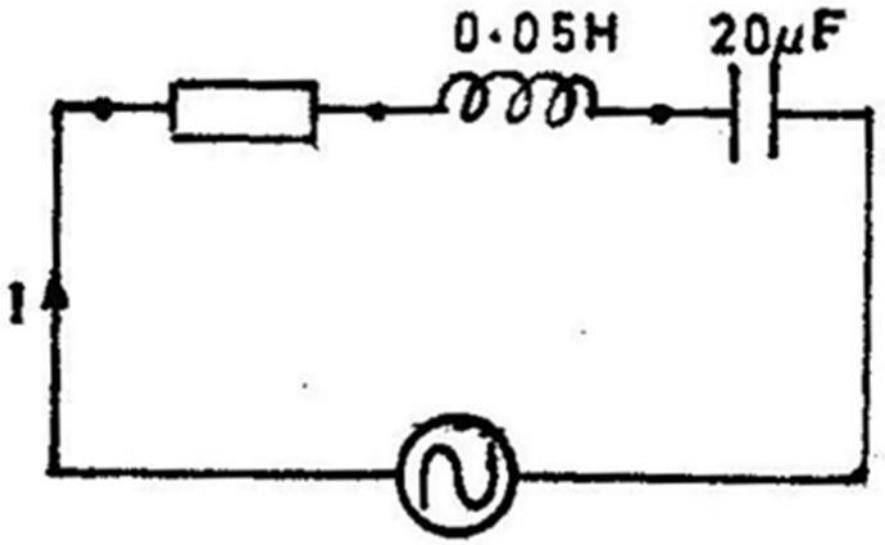


Figure 3

Calculate the
(i) resonance frequency;
(ii) inductive reactance;
(iii) capacitive reactance.

(a) and (b) This was by far the most answered question by majority of the candidates. Majority of the candidates defined reactance and impedance of circuit with respect to an alternating current.

Majority of the candidates could calculate the resonance frequency, inductive reactance and capacitive reactance by using the given formulae.

Candidates' performance was generally good.

Question 3

(a) An amplifier has an input signal of 1 mA at 10 mV and a corresponding output signal of 10 mA at 1V.

Calculate the
(i) voltage gain;
(ii) current gain;
(iii) power gain.

(b) Calculate in decibels the gains obtained in (a).

(a) and (b) Majority of the candidates attempted this question.
Candidates calculated the voltage, current and power gains and had the solution correct. Few candidates could not calculate the power gain in decibels.

Candidates' performance was fair.

Question 4

(a) Define compatibility with respect to colour T.V.

(b) List two secondary colours in T.V. system.

(c) Explain the following in T.V. receivers:

(i) brightness;
(ii) contrast;
(iii) aspect ratio.

(a) and (b) Majority of the candidates were able to define compatibility of a colour T.V and listed the secondary colours as: cyan, magenta and yellow.

(c) Few candidates could explain the brightness, contrast and aspect ratio of a T.V receiver.
The appropriate responses are:
Brightness is the total intensity of illumination of a picture. This depends on the amount of high voltage in the picture tube and the d.c bias in the grid cathode circuit.

Contrast is the difference in intensity between black and white parts of the reproduced picture.
Aspect ratio is the ratio of the width to height of the picture frame with an acceptable standard of 4:3.

Candidates' performance was poor.

Question 5

(a) State Faraday's Law of electromagnetic induction.

(b) Explain briefly how Faraday's Law applies in the operation of a transformer.

(c) State two applications of the transformer in electronics.

Majority of the candidates were able to state Faraday's Law of electromagnetic induction, but could not explain how Faraday's law applies in the operation of a transformer. This could be done by using three methods:

(i) By varying the source voltage which in turn induces voltage in the primary windings.
(ii) By varying current in the primary windings which produces varying magnetic flux and
(iii) By varying primary magnetic flux links in the secondary windings to produce voltage.
some of the applications of the transformer in electronics are: Impedance matching, voltage stepdown and isolation.

Candidates' performance was poor.

Question 6

(a) (i) Draw and label a circuit diagram of the Hartley oscillator.
(ii) Explain briefly the principle of operation in (a)(i).

Majority of the candidates drew and labelled the circuit diagram of the Hartley oscillator, and explained the principle of operation correctly. Performance of candidates was very good.

Question 7

(a) List two appliances each that operate on:
(i) open loop;
(ii) closed loop.

(b) List three transducers and state the form of energy conversion in each case.

This was not a popular question amongst the candidates.
Majority of the candidates had difficulty in responding to this question. Examples of appliances that operate on open loop system are: microwave oven, rice cooker and electric bell.
Examples of appliances that operate on closed loop system are: refrigerator, washing machine and pressing iron.

Few candidates were able to list the three transducers and stated the form of energy conversion.
Candidates' performance was fair.

METALWORK 1

1. GENERAL COMMENTS

The standard of the paper was the same as compared to that of previous years.
The questions were within the scope of the syllabus and covered a wide area of the syllabus content.
Majority of the candidates who took the paper prepared well and their performance could be compared with those of previous years.

2. A SUMMARY OF CANDIDATES' STRENGTHS

(1) Many candidates were able to complete their work.
(2) The parts were finished to the specified dimensions.
(3) Many candidates could develop the materials given them to resemble the drawings forming the detailed drawings.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

(1) Candidates found it difficult to develop the internal profile that is, the diagonal shape in Part A.
(2) Many candidates failed to mark-out the detailed profile before attempting to shape and cut out workpiece.
(3) Candidates failed to finish their prepared workpieces with safe edges. Filled edges remained sharp and dangerous to cause injuries.
(4) Bagged completed workpieces were dirty and rusty.

4. SUGGESTED REMEDIES

(1) Candidates should be taken through the process of first marking out their workpieces to required dimensions, punching marked out lines before attempting to cut out both internal and external features of work assemblies.
(2) Candidates should drill out waste material to provide access for forming internal shapes.
(3) After filing workpieces to the required shape, candidates are expected to file off all sharp edges left over.
(4) Finished workpieces should be smeared with light oil cover to prevent corrosion and rusting of the parts before bagging.

5. DETAILED COMMENTS

There were two tests in the paper: Test A constituting a fitting exercise and Test B forming a machining exercise. Candidates were required to attempt only one of the tests.

Candidates were supplied with one piece mild steel plate, 72 mm x 47 mm x 3 mm, 2 off for Part A ad B of the fitting exercise and one piece free cutting mild steel rod, Ø50 mm x 70 mm also to be used when attempting the machining exercise.

TEST A - FITTING EXERCISE

PART A

Candidates were required to mark out the detailed drawing on the workpiece material 72 mm x 47 mm x 3 mm after selecting one side and use appropriate standard metre rule to determine all the dimensions and with little bit cautiousness, scribe the shape as indicated in the detailed drawing.

After marking out with scribed lines the profile outline could be made clearer by dot punching.
The candidates were required to chain drill along the dot-punched profile to facilitate cutting. The waste material could be chiselled out to enable it to be filed. Candidates ought to have used rough file to remove the metal projections after drilling.
The external features could be reduced by filing from 72 mm to 70 mm and 47 mm to 45 mm with careful craftwork. After obtaining the profile, the completed work required to be finished by removing all burrs and sharp edges.

PART B

Similarly, the candidates were required to mark out the profile indicated in Part B from the given material 72 mm x 47 mm x 3 mm after determining one edge and filed as datum.
Candidates were expected to dot-punch along the profile before hacksawing close through the punched lines. Relatively small amount would be left to finish file to the accurate size and shape.

Finally, it was necessary that candidates filed off the projecting burrs and edges that posed danger for handling.
Besides, candidates needed to drill relief holes at the base of the hexagonal shape to facilitate fitting and assembly of Part A and Part B as indicated in the assembly drawing.
Cutting out the shape in Part A posed problems to many candidates.

TEST B - MACHINING

Candidates were expected to face turn one end of the rod Ø50 mm x 70 mm and centre-bore; change the workpiece in chuck and face the rod to the specified length of 65 mm and centre bore as well.
Remount the workpiece between centres and turn the outside to Ø48 mm using micrometer or caliper to monitor the size as the machining progressed on until the final dimension Ø48 mm was obtained.
The length of 15 mm taken from the headstock or leftward of the stock and the recess or undercut 5 mm to a depth of 14mm taken to complete work on the left side.

Candidates were again required to turn from right to left to obtain an outside diameter of Ø40 mm and to a length of 45 mm. After that the second recess or under cut was machined from right 20 mm from the end. The under cut was to be machined to 5 mm wide and 10 mm deep.
The end chamfers could be machined outright so that finally knurling was performed at left end shoulder of the tucked rod 15 mm from the end. The workpiece could be removed from the centres and held in appropriate chuck - 3 - jaw chuck preferable to enable the hole Ø12 mm be drilled - using a smaller drill size e.g. Ø10 mm be used first before finishing it up with the Ø12 mm drill size.
If well ground cutting tools were used from onset no separate operation could be anticipated or prove to be necessary.

METALWORK 2

1. GENERAL COMMENTS

The standard of the paper was good and compared favourably with that of the previous years.
The performance of candidates was generally similar to the previous years. However, there was marked improvement in the answers of some candidates.

2. A SUMMARY OF CANDIDATES' STRENGTHS

(1) Some good candidates showed clear understanding of the subject.

(2) Quite a number of candidates' answers were very legible which demonstrated that their handwritings had improved.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

(1) Candidates lacked the requisite skills in sketching diagrams.

(2) Some candidates were unable to spell technical terms correctly.

4. SUGGESTED REMEDIES

(1) Candidates should be taught the skills required in answering questions.

(2) Teachers should put in extra effort to expose candidates to a lot of sketching and spelling exercises.

5. DETAILED COMMENTS

Question 1

(a) State two reasons why safety precautions should be observed in the school workshop.

(b) (i) Explain why limestone is added to the charge of the blast furnace.

(ii) State two uses of slag obtained from a blast furnace.

(c) List three metals that can be machined dry.

(d) State the function of the depth stop on a drilling machine.

Many candidates answered this question. A good number of candidates who attempted it could handle it and scored high marks.

Question 2

(a) Describe how to avoid spinning of the workpiece when drilling.

(b) State the function of the following in sand casting:
- **(i) vents;**
- **(ii) sprue hole;**
- **(iii) core print.**

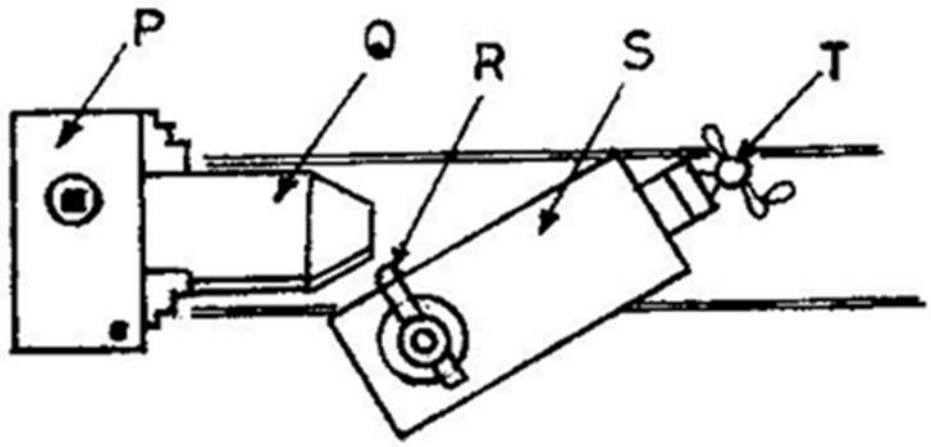
(c) Explain how a hacksaw blade is fixed to cut a long strip of metal.

(d) Sketch a straight hand snips.

With the exception of Part C of the question, candidates did well.
With the sub-question C, candidates were expected to explain that, the wing nut is loosened and the blade is removed, the bolt is rotated through an angle of 90° and the blade is finally mounted on the pins and tightened.

Question 3

(a) The sketch below is a lathe work set-up.



(i) Identify the lathe operation shown in the set-up.
- **(ii) Identify the parts labelled P, Q, R, S and T.**
- **(iii) State three steps involved to achieve the set-up.**

(b) State three types of cutting fluid.

(a) Some candidates did well in providing the required responses.
(b) A few candidates had problems answering this part of the question.

Question 4

(a) What is twisting?

(b) List two tools used in the following operations:
- **(i) twisting;**
- **(ii) drawing down.**

(c) State two reasons why the head of a soldering iron is made of copper.

(d) (i) With the aid of a labelled sketch, show a riveted joint with a snap head rivet.
- **(ii) State two faults in riveting.**

(a) Most candidates who attempted this question could not give the required response. Twisting is a forge work operation which involves heating a metal evenly, holding it in a vice or any suitable tool/equipment and turning it with a wrench through 90° or 180°.

(b) This part was well answered.

(c) The sketches were poorly presented.

Question 5

(a) Explain how draw filing is carried out.

(b) State two methods used to care for files.

(c) State one use of each of the following tools:
- **(i) angle plate;**
- **(ii) surface plate;**
- **(iii) scribing block;**
- **(iv) combination set.**

(a) This was not well answered. Draw filing requires that the file is held at right angle to the length of the metal and the file is moved forward and backward along its length. The hand should be held as close together as possible to reduce the tendency to wobble.

(b) This part was well answered.

(c) Majority of the candidates could state one use of each of the tools listed.

TECHNICAL DRAWING 1

1. GENERAL COMMENTS

The standard of the paper compared favourably with that of the previous year. The general performance of candidates was however poor when compared to that of the previous year.

2. A SUMMARY OF CANDIDATES' STRENGTHS

(1) Majority of the candidates drew to the given scale.

(2) Candidates differentiated between constructional lines and outlines.

(3) Candidates produced accurate orthographic projections.

(4) Majority of the candidates represented conventional units correctly.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

(1) Candidates could not produce enlargement of plane figures to a given area in terms of ratios appropriately.

(2) Majority of the candidates had difficulty in sectioning machine parts.

(3) Candidates poorly produced the external forces of a simple supported beam.

(4) Candidates used the concentric circles method in drawing the given ellipse instead of the foci method demanded by the rubrics.

4. SUGGESTED REMEDIES

(1) Teachers should emphasize the techniques of constructing the ellipse using the various methods.

(2) Candidates should practise drawing with different types of scales.

(3) Candidates should practise the drawing of parallel lines to one another in order to construct furnicular polygons.

(4) Teachers should teach the skill of sectioning machine parts.

5. DETAILED COMMENTS

Question 1

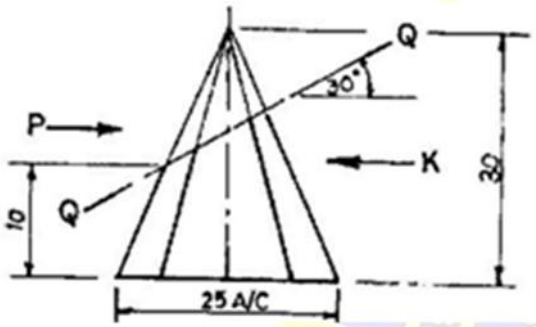
A hexagonal based pyramid is cut by a plane QQ as shown below. Draw, using scale 2:1, the

(a) given elevation,

(b) plan,

(c) end elevation into the direction of arrow P,

(d) true shape of the section.



The given scale of 2:1 required that the drawing was to be produced twice full size of the given dimensions, but most of the candidates drew half full size. Most candidates used their own dimension for the diameter of the given circle instead of 25 mm.

Candidates could not locate the positions of the cutting plane and drew it at different angles, i.e. either 45° or 60° to the horizontal and at different heights from the base of the pyramid.
The projectors from the cutting plane should be at right angles, but majority of the candidates drew the lines at different angles, making the surface produced inaccurate.

Few candidates did not section the cut surfaces in all the views.
Candidates' performance was good.

Question 2

(a) (i) Construct a regular heptagon in a circle of diameter 70.
(ii) State the length of the side of the heptagon.

(b) (i) Construct a similar heptagon whose area is 1.6 times the area of the given heptagon.
(ii) State the length of the side of the enlarged heptagon.

Majority of the candidates attempted the construction of the heptagon 70 mm, but they were unable to interpret the construction of a similar heptagon whose area is 1.6 times the area of the given heptagon. Conversely 1.6 times can be interpreted as $\frac{1}{16}$, or $\frac{10}{16}$, to enlarge $\frac{5}{8}$ the given heptagon to an area of 5:8 ratio.

Candidates' performance was fair.

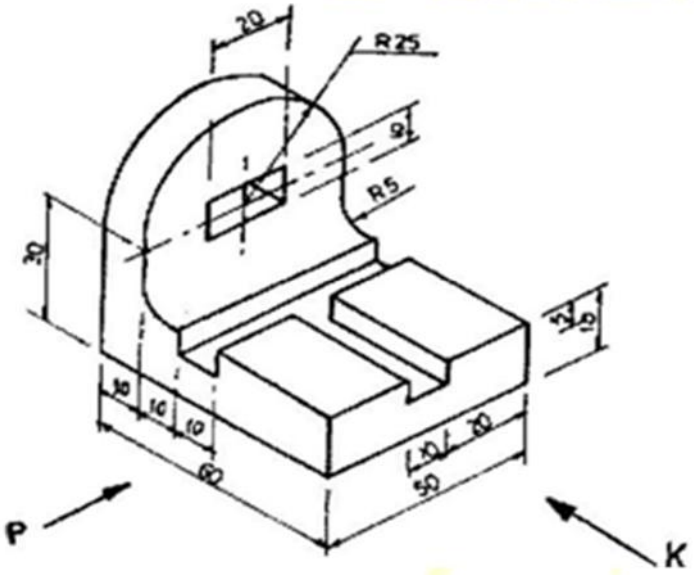
Question 3

The pictorial view of a sliding block is shown below.
Draw full size in first angle projection the following views, with hidden details:

(a) front elevation in the direction of arrow K;

(b) plan;

(c) end elevation in the direction of arrow P.



Majority of the candidates attempted this question. Few candidates drew the object in third angle projection instead of first angle projection.

Few candidates failed to indicate all the hidden details. The inner edge of the end view was to be drawn with an arc of radius 5 mm, but most candidates joined it with two straight lines while others used freehand for drawing the arc.

Candidates did not space out the views from the two axes. The elevation and the plan views were touching the horizontal axes while the end view was drawn far away from the vertical axis. Few candidates had all the three views touching the two axes. Candidates' performance was average.

Question 4

An ellipse has a major axis 120 and minor axis 80.

(a) (i) Determine by construction the positions of the two foci and state the distance between them.

(ii) Use the foci method to construct the ellipse in full size.

(b) (i) Construct a tangent to the ellipse at a point 30 above the major axis and to he left of the minor axis.

(ii) Determine and state the distance of the tangent point from the two foci.

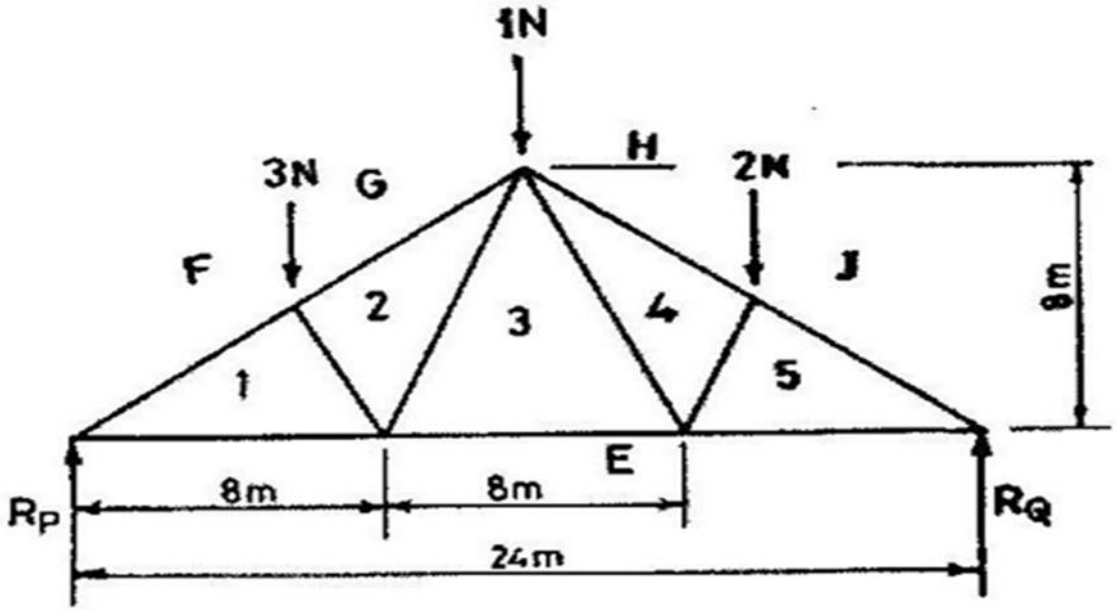
Majority of the candidates drew the minor and major axes to the correct dimensions, but used a different method for the construction. Concentric circle method was used instead of the required foci method demanded by the rubrics.

Joining the various points to obtain a smooth curve was not properly done. Most candidates did not construct the tangent and the normal, those who constructed the tangent could not locate the required point 30 mm above the major axis and to the right of the minor axis.

Few candidates forged to draw the tangent at any point on the ellipse without using any constructional method. Candidates lost focus of the technique in drawing the tangent. To draw the tangent, bisect the exterior angle of the two foci points.
Candidates' performance was good.

Question 5

The roof truss shown below carries three vertical loads.



(a) Draw to a scale of 1 mm = 0.2 m the space diagram labelling the spaces with Bow's Notation as indicated.

(b) Using graphical method and scale 1 mm = 0.1 N,

(i) determine the value of reactions R_P and R_Q;

(ii) construct the force diagram for internal forces in the members.

(c) State the magnitude and nature of the forces in the members F - 1, E - 1, I- 2, G - 2.

Few candidates did poor work in the construction of the roof truss, the overall span was 120 mm after the sale conversion but candidates did wrong calculations, thus having very small or large span for the roof truss resulting in poor construction of the space diagram.

The force diagram with a pole was constructed using the three given forces, i.e. 1N, 2N and 3N and the forces had to be converted into millimeters, but candidates did wrong calculations.
Majority of the candidates obtained the furnicular polygon from the force diagram.
Similar principles were applied for the construction of the forces in the internal members.

Most candidates did not convert the length of each member to millimeters. The nature of the forces in each truss member was not done correctly. Candidates' performance was generally poor.

TECHNICAL DRAWING 2

1. GENERAL COMMENTS

The standard of the paper compared favourably with that of the previous years.
The paper was within the capabilities of the candidates and there was a significant improvement in the performance of candidates.

2. A SUMMARY OF CANDIDATES' STRENGTHS

(1) Candidates who attempted the mechanical drawing option exhibited very good skills in hatching components.

(2) Majority of the candidates demonstrated good draughtmanship skills.

(3) Candidates drew to the required scale demanded by the rubrics.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

(1) Candidates exhibited weaknesses in freehand sketching of basic tools.

(2) Majority of the candidates could not section component parts properly

(3) Candidates who attempted the building option wasted a lot of time and therefore could not complete their work.

4. SUGGESTED REMEDIES

(1) Teachers should teach the skill of drawing freehand sketches.

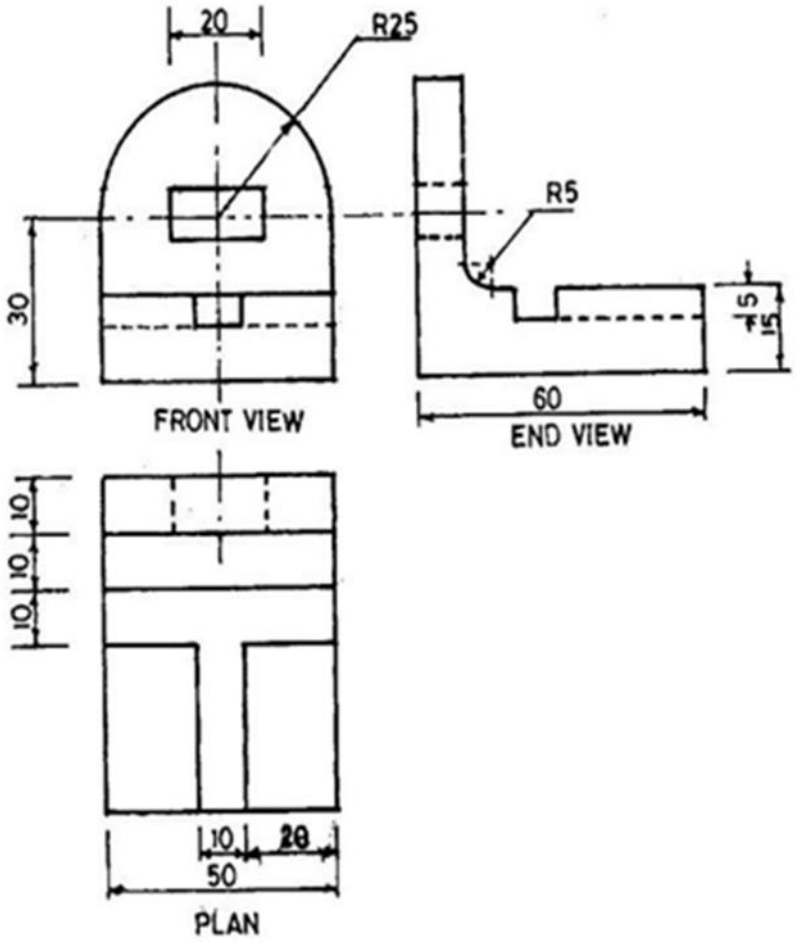
(2) Candidates should practice the interpretation of cutting plane details to enhance their knowledge base.

(3) Candidates should be given more exercises in orthographic projections to practice.

5. DETAILED COMMENTS

Question 1

Make a freehand isometric drawing of the block whose three views are shown in first angle below.



Most candidates found it difficult to assemble the three views in isometric. Few who drew the isometric block could not draw the left end view properly.
Majority of the candidates had good pencil work, but could not indicate all the necessary hidden details.

Question 2

Make a freehand pictorial drawing of a mallet hammer.

Majority of the candidates drew the mallet proportionally, but few candidates did not indicate clearly the head of the mallet. Other candidates used guided straight edge to sketch in freehand.
Candidates' performance was good.

Question 3

Make a freehand pictorial drawing of a bricklayer's trowel.

Majority of the candidates could not draw the bricklayer's trowel.
Few candidates could not draw in pictorial views.
Candidates' performance was poor.

Question 4

A sketch plan of a three bedroom bungalow with a dining room and visitors toilet attached was given in a line diagram form. A detailed specifications from foundation level, through to roof details was also provided.

Candidates were asked to draw
(i) to a scale of 1:100 the plan and front elevation;
(ii) to a scale of 1:50 the sectional elevation through a specified plane.

Majority of the candidates drew the demands of the rubrics without much of a problem, however, few candidates could not indicate the windows and doors with the appropriate conventional symbols.
Candidates could not indicate properly the various partitions that the cutting plane passed through, but few candidates drew to the specified dimensions. Most candidates could not project the front view from the plan and therefore had wrong dimensions for the front elevation. Candidates after drawing the sectional elevation could not identify parts specified by the rubrics to be labelled, i.e. foundation footings, floor finish, ceiling joist and wall plate. Performance of candidates was average.

Question 5

Candidates were given a working drawing of three views of a machine part drawn in first angle projection.
Candidates were asked to draw the sectional front elevation on a specified plane, sectional end elevation on a specified plane and the plan.

Majority of the candidates could not assemble the three views properly. Few candidates used the left end of the plan to be the lowest point of the assemble instead of the left end view of the front elevation. Sectioning was a problem for majority of the candidates. Candidates' performance was fair.

WOODWORK 1

1. GENERAL COMMENTS

The standard of the paper was of the desired quality and compared favourably with that of the previous years. The performance of the candidates can be said to be slightly better this year than that of last year.

2. A SUMMARY OF CANDIDATES' STRENGTHS

A few of the candidates were able to interpret the drawing, marked out correctly and produced an excellent work which is worth emulating by their low performing colleagues.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

(i) Candidates' inability to read and interpret the drawings correctly.
(ii) Candidates' inability to mark-out accurately.
(iii) Failure to use well-sharpened cutting tools.
(iv) Failure of candidates to write their names and index numbers on their workpieces for easy identification.
(v) Failure of candidates to tie workpieces which could not be assembled together.

4. SUGGESTED REMEDIES

(i) Teachers should intensify the teaching of orthographic drawings.
(ii) Teachers should give candidates practical exercises which involve the reading and interpretation of working drawings.
(iii) Teachers should ensure that all the basic tools needed for practical examinations are in proper working conditions before they are given to the candidates during practical examinations.

5. DETAILED COMMENTS

Candidates were given working drawings of a model of a panel door. They were required to interpret the drawing and construct the model using already prepared workpieces. The work involved the following processes:

(a) construction of mitred corner briddle joints;

(b) construction of stopped haunched mortise and tenon joints;

(c) grooving;

(d) fitting of a piece of plywood into grooves;

(e) assembling;

(f) finishing.

1. Mitred Corner Briddle Joint

The construction of the mitred corner briddle joint was attempted by all the candidates. Some of them marked-out accurately and produced remarkably good joints. However, a few of them lacked the requisite skills to cut and remove waste wood from the pins and sockets and as a result produced very poor work.

(a) Sockets: Cleaning of the sockets was not properly done due to the fact that some candidates used blunt tools. Some sockets were larger than the pins and could not fit properly.

(b) Pins: The sides of the pins were not properly cleaned. Some pins were not centralised and not cut to size.

2. Stopped Haunched Mortise and Tenon Joint

Majority of candidates attempted this question. However most of those who attempted the question could not provide the haunches. A few who provided the haunches were out of proportion. Some candidates could not clean the mortises properly.
Buttons of the haunches on the mortises were also not cleaned properly.

3. Grooves

Few candidates were able to provide accurate grooving, most of them provided shallow grooves with very rough buttons and broken edges. Others could not run the grooves through the pins but stopped them.

4. Chamfers

Majority of candidates could not produce the chamfering. The few who provided the chamfering on the stiles run it through instead of stopping it to create the 'mason's mitre' on the rails as indicated on the drawing.

5. Plywood fitting

Most candidates could not prepare the sides and ends of the plywood. Majority did not fit the plywood due to their inability to provide the grooving to accommodate it.

6. (i) Assembling

Majority of candidates were not able to assemble the work. Some tied the workpieces with cords for easy identification. Others were mixed up in the boxes making it extremely difficult for examiners to sort them out especially those not properly labelled.

(ii) Dressing

Majority of the few candidates who assembled their work did not dress them to provide the desired appeal.

(iii) Squareness

Most of the work assembled were square and accurate.

WOODWORK 2

1. GENERAL COMMENTS

The standard of the paper was quite good for their level and compared favourably with that of the previous years.

2. A SUMMARY OF CANDIDATES' STRENGTHS

The general performance of the candidates was average, a few however performed above average. A few candidates performed creditably in the following areas:

(i) preliminary freehand pictorial sketches;
(ii) orthographic drawings of the display cabinet in the First Angle projections;
(iii) sketches to illustrate methods of fixing the front glass to the cabinet;
(iv) good draughtsmanship was also exhibited.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

Majority of the candidates showed weaknesses in the following areas:

(i) inability to provide the required features of the display cabinet;
(ii) failure to provide title block and required details;
(iii) poor dimensioning and lettering;
(iv) inability to draw the method of fixing the front glass to the cabinet;
(vi) cutting plane was completely omitted on the front elevation.

4. SUGGESTED REMEDIES

(i) Tutors should encourage their students to prepare well towards examinations.

(ii) Candidates must be given enough exercises on design and drawing to enable them acquire the necessary skills for good performance.

5. DETAILED COMMENTS

A display cabinet is to be designed to meet the following specifications:
width - 500;
depth - 300;
height - 600, (including the base);
the front is glazed;
the sides are not glazed;
the back has a lockable glass panel door;
the cabinet has one shelf.
(All dimensions in mm)

1. Make two different preliminary freehand pictorial sketches of the cabinet.

2. Select one of the sketches in Question 1 and to a scale of 1:5, draw in the First Angle Orthographic projection, the following:
(a) the front elevation;
(b) the back elevation;
(c) a sectional plan.

3. Use a sketch to illustrate how the front glass is fixed.

1. Freehand Pictorial Sketches

A few candidates presented designs that agreed with the given specifications. Majority of the candidates however produced the preliminary pictorial sketches with the aid of drawing instruments instead of drawing with pencils only. Most of them also failed to indicate the selected design before drawing the required views.

2. Front Elevation

All the candidates attempted this question, considering the principles of First Angle orthographic projections. Most of the candidates failed to indicate on the drawings how the front glass was positioned and supported.
Most of the candidates omitted:
- cutting plane;
- shelf in hidden details;
- the base/or stand;
- dimensions;
- name of the view.

3. Back Elevation

This view was not satisfactorily drawn. The view was wrongly placed against the front elevation infringing the principles of Orthographic projections.
Most candidates did not show the following member and fittings:
- shelf for the display cabinet in hidden details;
- key hole to indicate lock in place;
- hinges;
- handle/pull;
- base or stand to raise the cabinet from the ground;
- dimensions;
- name of the view.

4. Sectional Plan

Most candidates could not produce good drawings.
The major details such as panelled door, front glass and two sides of the cabinet in section were not shown.

5. Methods of Fixing the Front Glass

Majority of the candidates failed to handle this question satisfactorily.
The appropriate methods to use include:
- rebate and planted beads;
- planted beads only.
A few of the candidates who attempted the question failed to label the members.

6. Draughtsmanship

(i) Border line

Most of the candidates failed to draw the border lines.

(ii) Title block

Majority of the candidates failed to provide the title block.

(iii) Layout

Most of the candidates failed to plan their work properly. Some candidates drew some of the views anyhow on the drawing paper.

(iv) Lettering

All the candidates exhibited poor skills in lettering. The use of upper and lower cases were poorly employed.

(v) Neatness

Most of the candidates failed to produce neat freehand pictorial views and working drawings of the cabinet. This was due to poor pencil work, poor planning of views on the drawing paper and over-shading of sketches.

WOODWORK 3

1. GENERAL COMMENTS

The standard of the paper was comparable with those of the previous years.
The questions cut across the whole spectrum of the syllabus. It was within the level of the candidates.

2. A SUMMARY OF CANDIDATES' STRENGTHS

No question was left out in candidates selection of questions to answer, which shows that all the questions were from the syllabus.

Candidates did very well in the following areas:
(a) safety precautions.
(b) sketches of defects in timber and the back-flap hinge.
(c) naming parts of the cross-section of a log.
(d) the use of templates in the workshop.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

(a) Candidates could not label parts of their sketches well.
(b) Candidates could not list the steps in bonding a plastic laminate to a piece of plywood properly.
(c) Candidates found it extremely difficult to sketch an exploded view of a through haunched mortise and tenon joint.

4. SUGGESTED REMEDIES

(a) Tutors should teach candidates to know that labeling parts of any sketch is done on the sketch.
(b) Sketching of exploded views of joints should be given serious attention by teachers.
(c) Teachers should introduce students to the practise of carrying out many of the activities in woodwork such as veneering and bonding of plastic laminate to plywood.

5. DETAILED COMMENTS

Question 1

(a) (i) State four clothing safety rules to be observed in the workshop.
(ii) State two causes of injury when using a chisel.
(b) (i) List four types of boring tools.
(ii) Sketch one of the tools listed in (b) (i).
(iii) Label two parts of the tool you have sketched in (b) (ii).

(a) Most of the candidates answered the question very well.

(b) A few candidates answered the question well. Others however sketched tools which were not boring tools whiles others wrote the labelling not against the sketches but somewhere. Some candidates also sketched a boring tool that was not listed.

Question 2

(a) Describe each of the following timber seasoning defects:
(i) spring;
(ii) honeycomb;
(iii) cup.

(b) Illustrate with a sketch any one of the defects listed in (a).

(c) (i) Sketch the back-flap hinge.
(ii) State one use of the back-flap hinge.

(a) Some candidates mixed up the description of spring and cup defects, and did the same with the sketches in Question (b).

(c) Majority of candidates were able to sketch the back-flap hinge. They however gave the general use of hinges as the use of a back-flap hinge.

Question 3

(a) List eight steps involved in bonding a plastic laminate to a piece of plywwod that has been cut to size using contact adhesive.

(b) Figure 8 shows the cross-section of a log.
Name the parts labelled P, Q, R and S.

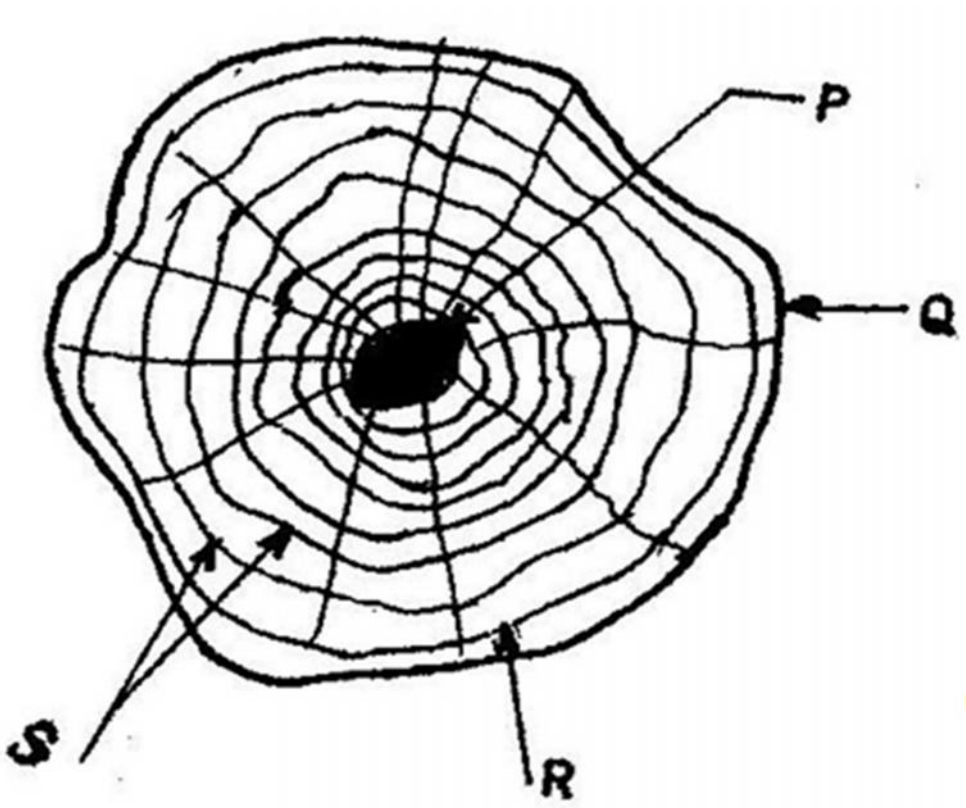


Figure 8

(c) State the purpose of each of the following in relation to seasoning:

(i) stickers;

(ii) steam;

(iii) fans;

(iv) vents.

(a) A clue was given in the question that the plywood had been cut to size already, yet some candidates started with cutting the plywood and laminate to size. They therefore had problems getting the eight steps demanded by the question, whiles they side-stepped some vital steps.

(b) Some candidates wrote'pitch' for 'pith' and 'back' for 'bark'.

(c) A few candidates were able to answer these questions correctly. The required answers are:

(i) stickers - used to allow air circulation.

(ii) steam - to reduce the wood drying too fast.

(iii) fan - to circulate steam and warm air.

(iv) vents - to allow movement of steam.

Question 4

(a) (i) State the two main components of paint.
(ii) Explain the function of each of the components you have stated in (a) (i).

(b) State the use of templates in the workshop.

(c) Sketch an exploded view of a through haunched mortise and tenon joint.

(d) List five types of material used for padding in upholstery.

(a) (i) Candidates confused themselves with components and types. They therefore wrote emulsion and oil paints for pigment and vehicle.

(ii) Pigment provides the paint colour whiles vehilce makes it easy to be applied.

(b) This question was well answered by most of the candidates.

(c) Candidates could not sketch the joint. Most of them tried to sketch a through mortise and tenon joint.

(d) Candidates were asked to list five materials but they listed tools used in u pholstery which was a past question.
Candidates should read questions well and understand the requirements of questions before they begin to answer them.