

RESUMÉ OF **TECHNICAL SUBJECTS**

1. **STANDARD OF THE QUESTION PAPERS**

The standard of the papers compared favourably with those of previous years. All the questions were within the syllabus. The standard was the same in content and level of difficulty.

2. **PERFORMANCE OF THE CANDIDATES**

According to comments by the Chief Examiners, performances of candidates were encouraging in Technical Drawing 3 in some schools, and very poor in others. Technical Drawing 2 performance was not bad. Performance in Auto Mechanics 3 was better, whilst there is a serious decline of performance in Auto Mechanics 2.

Candidates' performances in Woodwork 2 and 3 were satisfactory and slightly better respectively. Those of Building Construction 2 and 3 were reported to have improved although some candidates in Paper 2 appeared not to be ready for the examination.

In Information and Communication Technology 2, the Chief Examiner reported of an average performance whilst the Paper 3 showed localized brilliant performances. That is to say, candidates in some schools performed excellently whilst others produced very poor work. Performance in Electronics 2 was described as poor and in Electronics 3, it was at par with that of the previous year. Most candidates did not perform well in Metalwork 2 according to the Chief Examiner, but performance in Metalwork 3 was satisfactory.

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

The Chief Examiners identified the following commendable features in candidates' work.

(1) **ORDERLY PRESENTATION OF ANSWERS**

It was mentioned in the reports of Metalwork 2, ICT 2, Building Construction 2 and 3 that an appreciable number of candidates adhered to the rubrics of their respective papers. Attempted questions were clearly numbered, handwritings were legible enough and most candidates attempted new questions on fresh pages.

(2) **APPRECIABLE KNOWLEDGE OF THE SUBJECT MATTER**

The Chief Examiners pointed out that responses provided by candidates showed very good knowledge in their field of study.

In ICT 3 candidates showed an improvement in query creation. In Technical Drawing 3, most candidates who opted for the mechanical drawing showed improvement over previous years. The draughtsmanship of most candidates was encouraging. In Technical Drawing 2, candidates were accurate in their measurement of lines and angles and also proper convention for centre lines was adopted. Some candidates in Electronics 2 had in-depth knowledge of classes of amplifiers and combinational logic circuit. Calculating electrical power and energy in a d.c. circuit was well done in Applied Electricity 2. In Metalwork 3 candidates' familiarity with the technical terminology and ability to interpret detailed drawings were commended.

(3) EXHIBITION OF GOOD PRACTICAL SKILLS

It was reported that candidates' ability to interpret the working drawing and mark out correctly had improved in Woodwork 3 and in Electronics 3, majority of the candidates understood the questions and the circuit diagrams and performed the two experiments.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

The Chief Examiners identified the following weaknesses in candidates' work:

(1) POOR USE OF ENGLISH LANGUAGE

Candidates of Building Construction 2 and 3 were said not to be able to spell simple four letter words used in the industry. In ICT 2, candidates had poor communication skills.

(2) LIMITED KNOWLEDGE IN SUBJECT MATTER

The Chief Examiners indicated in their reports that the responses candidates gave to some questions pointed to their limited knowledge in the subject matter. In Technical Drawing 2, some candidates were said to be drawing as if they were not using a combination of T-square and set squares resulting in parallel lines being unparallel. Then again candidates were given a figure that showed intersection of two square pipes but they drew elevation of two cylindrical pipes. Candidates for Auto Mechanics 2 used diagrams and sketches which were not workable in supporting descriptions of engine parts. Candidates could not answer questions on brakes nor give reason for decarbonizing an engine.

The Chief Examiner for Woodwork 3 reported that most candidates were unable to read and interpret the working drawings correctly and could not mark out correctly. In Woodwork 2, candidates could not state the reason why a lubricant is used on an oilstone when sharpening a tool. Most candidates did not apply the theory knowledge of the series connected resistors in a d.c. circuit in Electronics 3. Most candidates exhibited weakness in the definition of laws in Electronics 2.

The electronics section of Applied Electricity 2 was poorly answered. Transistor configurations and basic communication principles were not understood.

(3) **POOR PRACTICAL SKILLS**

Candidates showed poor practical skills in their failure to use well sharpened cutting tools and their inability to mark-out in Woodwork 3. It was observed from candidates' answers in Technical Drawing 3 that assembling of components is a problem to candidates who offered the mechanical drawing option. Candidates who offered building drawing had difficulty in using the scales. Candidates of Auto Mechanics 3 had difficulty in following the correct process of removing cylinder head and the process of slackening of wheel nuts. Candidates could not create L1 Query in ICT 3. Poor finishing and inaccuracies in work dimensions was a weakness in Metalwork 3.

4. **SUGGESTED REMEDIES FOR THE WEAKNESSES**

The Chief Examiners held the view that if the following suggestions could be taken by school authorities and candidates, they will help the candidates to overcome their weaknesses.

- (1) Candidates should use much of their time to read more on their subject and get in tune with technical expressions and words.
- (2) Candidates must be taught the rudimentary skill of using the T-square to draw parallel lines in Technical Drawing 2.
- (3) Books on the subjects need to be recommended for purchase by individual students.
- (4) Candidates should be given adequate exercises on design and drawing to enable them acquire the necessary skills for appreciable level of performance.

- (5) Heads of institutions must ensure adequate coverage of the syllabus before the examination.
- (6) Candidates must be exposed to more laboratory work to build their confidence and skill in practical activities.
- (7) Candidates should be provided with all the tools required in the acquisition of knowledge and skills and be motivated to develop good taste for accurate products.

APPLIED ELECTRICITY 2

1. GENERAL COMMENTS

The standard of the paper has remained the same. It is therefore expected that the overall performance of candidates would improve considerably this year especially in the area of Electronics.

2. A SUMMARY OF CANDIDATES' STRENGTHS

- (1) Candidates' strengths found in the area of solving problems in
 - (i) a series Resistance Capacitance (RC) network and use values to calculate impedance (Z) of the circuit.
 - (ii) calculating Electrical Power and Energy in a d.c. circuit.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

Transistor configuration was not well understood by majority of the candidates.

4. SUGGESTED REMEDIES

- (1) Much interest ought to be generated in students to take electronic section of the syllabus seriously.
- (2) Teachers must guide students to understand principles and theories of Applied Electricity.

5. DETAILED COMMENTS

QUESTION 1

- (a) Define the following terms:
 - (i) electric power;
 - (ii) electric energy.
 - (b) Three resistors are connected in parallel across a 12 volts supply. If the current flowing through each resistor for 45 seconds is 5 mA, 2 mA and 6 mA respectively, calculate the:
 - (i) quantity (Q) of electricity in the circuit;
 - (ii) electrical power (P) consumed;
 - (iii) electrical energy (W) consumed.
- (a) The definition of the terms: (i) electric power and (ii) electric energy did not pose much problem to many of the candidates. However, correct units were not given to the quantities defined.
- Some candidates chose to put down the formula, yet interchanged the units. The units and the correct formula for each quantity is shown below:

QUANTITY	UNIT	FORMULA
Electric Power (P)	Watt	$P = VR, I^2R$ or $\frac{V^2}{R}$ or $\frac{\text{Energy}}{\text{Time(sec)}} = \frac{E}{T \text{ sec}}$
Electric Energy (E)	Joules	Power x time (PT) = VIT
Quantity of Electricity (Q)	Coulomb	I t (where I = current; T= time in seconds or milliseconds Milli = 10^{-3})

Candidates' performance was good.

QUESTION 2

- (a) **Draw and label the power triangle.**
 (b) **A series RC circuit has a resistance of 3Ω and a capacitive reactance of 4Ω , calculate the impedance of the circuit.**

A good answered question, especially section (b) which demanded candidates to calculate the impedance of a series RC circuit.

Though the question demanded draw and label the power triangle, unfortunately, some drew the impedance triangle. The triangles are the same but their labeling are different.

QUESTION 3

- (a) **State two sources by which a battery can be re-charged.**
 (b) **State the principle of operation of the following:**
 (i) **solar cell;**
 (ii) **accumulator.**

- (a) The two main sources of re-charging a battery is by using (i) solar cell/photo voltaic and (ii) D.C source obtained from a rectifier and not electric power stated by some candidates. An electric power or electricity is an alternating current (a.c.) and has to be converted to a (d.c.) direct current by the use of a rectifier.
- (b) A poor answered question by many candidates especially (b)(ii) Accumulator. An accumulator/Battery uses two dissimilar electrodes/metals immersed into an electrolyte and the whole unit connected to a d.c. source. This process is called charging. It is therefore an energy storage device which accepts energy and releases the electrical energy when needed.

Candidates' performance was fair.

QUESTION 4

State the function of the following in a d.c. generator:

- (a) **yoke;**
 (b) **poles;**
 (c) **commutator;**
 (d) **armature.**

A popular and well answered question. Many candidates were able to state the function of the yoke and poles.

Since they lack the principles of electromagnetic induction, candidates could not state well the function of a commutator and armature in a d.c. generator.

Candidates' performance was generally good.

QUESTION 5

Draw and label the following npn transistor configurations:

- (a) **common emitter;**
- (b) **common base;**
- (c) **common collector.**

The circuit symbol and labelling of the three transistor configurations, namely Common Emitter, Common Base and Common Collector were poorly carried out by majority of the candidates.

The circuit connection is named after the electrode which is connected to the common line for the transistor input and output signals.

QUESTION 6

- (a) **Define the gain of an amplifier.**
- (b) **Figure 1 is an inverting amplifier.**

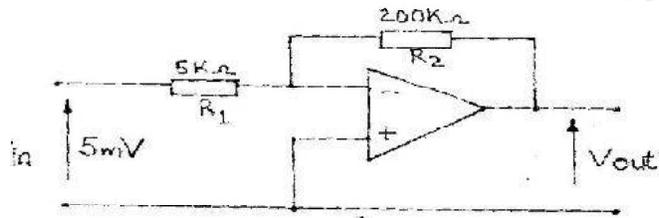


Figure 1

In Figure 1, calculate the:

- (i) **voltage gain;**
- (ii) **output voltage.**
- (c) **List two applications of an operational amplifier.**

Although many candidates managed to define the gain of an amplifier, they could not use the inverting op – Amplifier circuit drawn in fig. 1 to get the correct answers for (i) voltage gain and (ii) output voltage for the amplifier.

QUESTION 7

- (a) **Define the term demodulation.**
- (b) **Sketch a labelled diagram of an amplitude modulated wave.**
- (c) **An audio signal of 2.5 kHz is used to modulate a carrier signal of 750 kHz. Calculate the bandwidth of the signal.**

Another poorly answered question. The question is based on basic principles of Radio Communication which some of the candidates lack. Hence, they could not

- (i) sketch the amplitude modulated wave and
- (ii) calculate well to get the correct answer for the bandwidth of the signal.

Candidates' performance was generally poor.

APPLIED ELECTRICITY 3

1. **GENERAL COMMENTS**

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

Candidates' performance in general was slightly below the previous years.

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

- (1) Candidates used good scales in plotting their graphs.
- (2) Candidates were able to connect their circuits correctly and therefore had good values.
- (3) Majority of the candidates used the points of best fit in plotting their graphs.

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

- (1) Candidates were unable to compare the value of the slope with the value of the fixed resistor.
- (2) Few candidates could not connect the rheostat correctly.

4. **SUGGESTED REMEDIES**

- (1) Teachers should teach students how to connect a rheostat in a given circuit diagram.
- (2) Candidates should be given more exercises to reinforce their practical knowledge and skills.
- (3) Teachers must use Veroboards and Quicktest boards in demonstrating practical lessons to candidates.

5. **DETAILED COMMENTS**

Candidates were provided with the following apparatus:

one variable d.c. power supply unit (0-30 V);

one rheostat (Rh) 10 Ω , 6.5 A;

one voltmeter (0 – 10 A);

one voltmeter (0 – 15 V);

two 10 Ω , ½ W resistors

a set of handtools;

connecting wires.

QUESTION 1

AIM: To demonstrate Ohm's law.



- (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

Current (A)	Potential difference (V)
2.00	
1.80	
1.60	
1.20	
1.00	

- (d) **Adjust the power supply unit to 20 V and maintain this voltage throughout the experiment.**
- (e) **Vary the rheostat to indicate a current of 2.0A on the ammeter.**
- (f) **Read and record the corresponding value of voltage (V).**
- (g) **Repeat steps (e) and (f) for the other current values in Table 1.**
- (h) **Plot a graph of potential difference (V) on the vertical axis against current (A) on the horizontal axis.**
- (i) **Determine the slope of the graph.**
- (j) **Compare the value of the slope in (i) with the value of the fixed resistor.**

Majority of the candidates were able to connect the circuit successfully and therefore had good results.

Few candidates could not connect the polarities of the rheostat and therefore the values of the potential difference varied.

Candidates plotted good graphs using the points of best fits.

Candidates had difficulties in determining the slope of the graphs.

Candidates' performance was fair.

QUESTION 2

AIM: To demonstrate the relationship between current, voltage and power in a d.c. circuit.

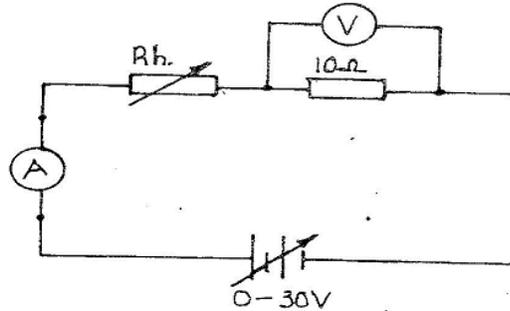


Figure 2

- (a) Connect the circuit as shown in Figure 2.
- (b) Ask the supervisor to check the circuit connection.
- (c) Copy Table 2 in your answer booklet.

Table 2

Voltage (V_2)	Voltage (V_{R2})	Current (A)(I)	Power (W) IV_{R2}
12			
10			
8			
6			
4			
2			

- (d) Adjust the power supply unit to 12 V.
- (e) Read and record the current (A) and voltage drop across the resistor R_2 .
- (f) Repeat steps (d) and (e) for the other values of voltage in Table 2.
- (g) Complete Table 2.
- (h) Compare the voltage drop across R_2 and the power calculated.

Majority of the candidates connected the circuit diagram and were able to vary the voltages to obtain the voltages drops across the resistors

Few candidates failed to indicate the values of power in the Table 2 provided.

Candidates' performance was generally fair.

AUTO MECHANICS 2

1. GENERAL COMMENTS

The paper was comparable to those of previous years. Students' performance this year has seriously declined though a few of them did very well.

2. A SUMMARY OF CANDIDATES' STRENGTHS

- (1) Answers to question on precautions observed on checking electrolyte was good.
- (2) A number of candidates could identify some parts of the three sliding mesh gear box and listed the two types.
- (3) Performance on types of vehicle cooling system and the terms syphon was good.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

- (1) Diagrams and sketches used in supporting descriptions were not accurate and workable.
- (2) Descriptions of concepts were nebulous.

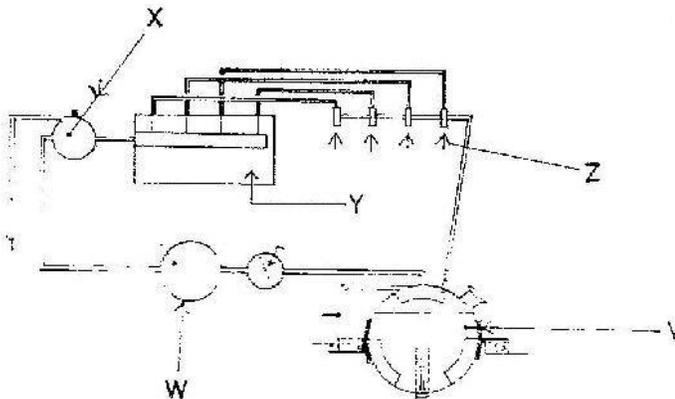
4. SUGGESTED REMEDIES

- (1) Candidates/students need to be motivated by instructors.
- (2) Instructors need to reconcile theory with practice.
- (3) Books on the subject need to be recommended for purchase by individual students.

5. DETAILED COMMENTS

QUESTION 1

The sketch in Figure I shows the layout of the fuel supply system of a compression ignition engine.



- (a) **Identify the parts labelled V, W, X, Y and Z.**
- (b) **State the purpose of the part labelled X.**
- (c) **State two merits and two demerits of a compression ignition engine.**

This was the most popular question attempted by a larger number of candidates.

- (a) The correct names for the labelled parts were:
 - V - Fuel tank or tank
 - W - Lift pump or fuel pump
 - X - Fuel filter or filter
 - Y - Injector pump or Injection pump
 - Z - Injector/Atomizer

It is very unfortunate some candidates could not differentiate between the injection pump and injector. Funny names such as ignition pump, tank, ignition rotor, etc were answers given.

- (b) A good number gave the correct answer as fuel filter. The purpose of the fuel filter is to prevent water, sand and dirt from entering the injection pump which can cause corrosion and wear.
- (c) Among the good answers expected were the following:

MERITS

- Better fuel consumption or improved fuel economy
- Higher engine torque
- Less maintenance is required
- Less fire risk
- Greater thermal efficiency
- Cost of fuel is cheaper than petrol
- Exhaust gas is less harmful
- Longer engine life or more durable
- Engine is stronger and more reliable

DEMERITS

- Parts are heavier
- Engine is noisier
- Parts are expensive
- Slower rate of acceleration
- Higher maintenance cost

QUESTION 2

- (a) **List three types of oil pump.**
- (b) **Sketch one type of oil pump.**
- (c) **Describe how to change an engine oil.**

- (a) This was one of the questions poorly answered by candidates.

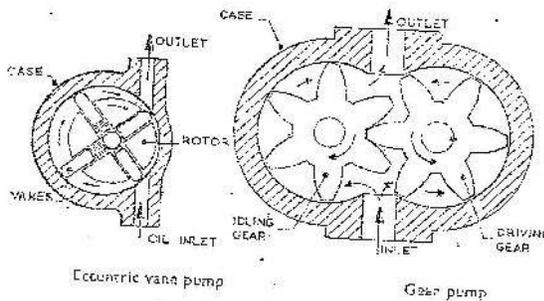
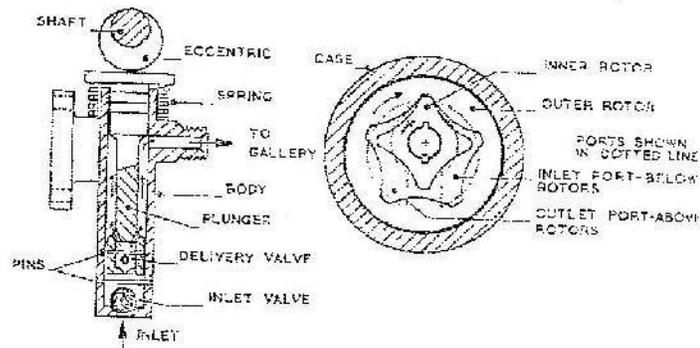
Three (3) types of oil pump include the following:

- Gear pump
- Plunger
- Eccentric vane pump
- Rotor or rotary pump

A lot of strange names such as; mechanical, lasentric, electrical and water pumps were given.

- (b) Sketches produced were nothing to write home about. Candidates were expected to take pains to make accurate sketches which are workable.

Examples of sketches required are shown below:



QUESTION 3

- (a) State two safety precautions to be observed on each of the following:
- (i) checking the specific gravity of an electrolyte;
 - (ii) jacking a vehicle;
 - (iii) Working on an overheated water-cooled engine.
- (b) (i) What equipment is used to put out fire in an engine.
(ii) Name the constituent of air that supports combustion.
- (a) (i) Attempts to answer the question were good.

Correct answers given include the following:

- Wear rubber apron or protective clothing
- Keep naked flame away from the battery
- Keep the top of the battery dry
- Avoid spilling of the electrolyte on the battery
- Keep the hydrometer vertically when taking the reading

(ii) This part of the question was not fully answered, some candidates were wrong when they stated that axle stands should be used when jacking a vehicle. Axle stands are used to support the vehicle after jacking the vehicle.

Safety precautions to be observed include:

- Ensure vehicle is on a level ground
- Ensure appropriate jack is used
- Use a jack in a good working condition
- Use wedges to chock the unraised tyres
- Place the jack at the appropriate point

(iii) This question was poorly attempted by candidates.

The required answers include:

- Switch off the engine
- Open the bonnet
- Allow engine to cool down for a few minutes
- Turn the cap briefly to release the pressure in the system
- Allow the engine to cool down properly before refilling the radiator
- Never pour cold water into the radiator of a hot engine

(b) (i) A good number of candidates stated fire extinguisher.

(ii) A good number stated oxygen while others stated hydrogen.

QUESTION 4

The sketch in Figure 2 represents a three sliding mesh gearbox in a neutral position.

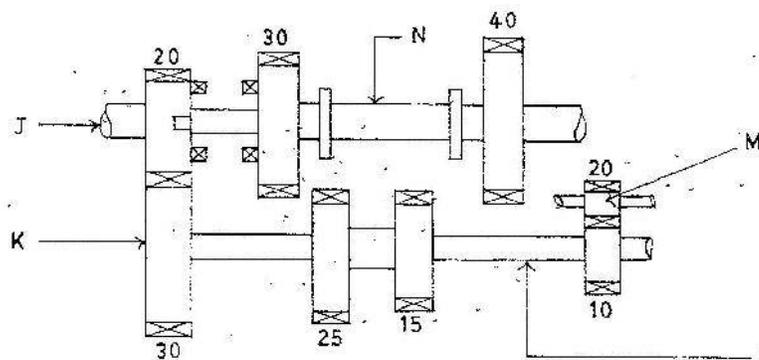


Figure 2

(a) Identify the parts labelled J, K, L, M and N.

- (b) Calculate the first gear ratio.
 - (c) Calculate the reverse gear ratio.
 - (d) List the two types of gear teeth used in a constant mesh gearbox.
- (a) A few of the candidates did well, others had problem with M, which they gave names as reverse gear, input gear, intermediate gear, etc.

The labelled parts were:

- J - Input, clutch, primary, first motion or spigot shaft.
- K - Constant mesh gear
- L - Layshaft or countershaft
- M - Reverse idler gear or idler gear
- N - Mainshaft, output or third motion shaft

- (b) Unfortunately no candidate was able to calculate the first gear ratio.

The first gear ratio is calculated as follows:

By formula;

$$\begin{aligned}
 G.R &= \frac{\text{Driven}}{\text{Driver}} \times \frac{\text{Driven}}{\text{Driver}} \\
 &= \frac{30}{20} \times \frac{40}{15} \\
 &= 4:1
 \end{aligned}$$

Gear Ratio in the 1st gear = 4:1

- (c) The calculation of the reverse gear ratio is as follows:

$$\begin{aligned}
 R.G.R &= \frac{\text{Driven}}{\text{Driver}} \times \frac{\text{Driven}}{\text{Driver}} \times \frac{\text{Driven}}{\text{Driver}} \\
 &= \frac{30}{20} \times \frac{20}{10} \times \frac{40}{20} \\
 &= 6:1
 \end{aligned}$$

- (d) Quite a good number of the candidates had it correct and others were wrong. Answers expected were: spur gears or Helical gears.

QUESTION 5

- (a) List the two forms of cooling system employed in motor vehicle engines.
- (b) (i) With aid of a sketch, describe how the thermos-siphon system operates.
(ii) Label four parts of the sketch in (b)(i).
- (c) Name the two types of thermostat used in a cooling system.

- (a) Candidates' performance was good but some were confused stating the types of cooling employed in the water cooling system.

The two forms of cooling system are:

(1) Air cooling and (2) Water cooling system.

- (b) Those who attempted to describe the operation of the thermos-syphon system did well.
- (i)&(ii) Sketches which were provided were different from the thermos-siphon pump assisted cooling.
- (c) The answers given were the Bellow and Wax type but even that, candidates had problem with how these two words were spelt.

AUTO MECHANICS 3

1. **GENERAL COMMENTS**

The standard of this year's paper compares favorably to that of the previous years.

Candidate's performance was better this year.

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

- (a) Most candidates were able to remove the cylinder head for De-carbonization of combustion chamber:
- (b) Examination of cylinder head gasket was fairly done by most candidates.
- (c) Some candidates were able to remove the brake drum and examine its inner parts.
- (d) Examination of brake shoes was properly done by most candidates.

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

- (a) Candidates could not Explain the purpose of de-carbonizing of cylinder head.
- (b) Candidates could not name the essential tools needed for de-carbonizing.
- (c) They could not follow the correct process of removing brake drums.
- (d) Candidates could not follow the correct process of slackening wheel nuts.
- (e) They had difficulty in the adjustment of brake band.
- (f) Answering of questions on brakes was a problem for candidates.
- (g) Most candidates had challenges with refitting of the road wheel.

4. **SUGGESTED REMEDIES**

QUESTION 1

- (a) Teachers should give reasons to students why de-carbonizing is done during classes as well as explain the brake system to students.
- (b) Students should be guided to select and use all the necessary tools for de-carbonizing an engine.
- (c) Students should be guided to organize the process of decarbonizing an engine
- (d) Students should be guided in the use of the right tool and the correct procedure of removing and re-tightening of cylinder head as well as correct techniques of slackening of road wheels

5. **DETAILED COMMENTS**

QUESTION 1

From the engine provided:

- (a) **Remove the cylinder head.
Report to the examiner.**
 - (b) **Examine the combustion chamber.
Report to the examiner.**
 - (c) **De-carbonize the combustion chamber.
Report to the examiner.**
 - (d) **Examine the cylinder head gasket.
Report to the examiner.**
 - (e) **Answer two relevant questions from the examiner.**
 - (f) **Refit the cylinder head on the engine block.
Report to the examiner.**
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- (a) Though candidates were able to remove the cylinder head, the procedure for the removal was not done orderly. Instead of being done radially it was mostly done serially.
This is done by using a socket of the correct size and a solid bar, starting from the centre and working radially outwards.
 - (b) The combustion chamber is mostly in the cylinder head and so visually it is inspected for faults, i.e. cracks, carbon deposits, etc. This was fairly done by candidates.
 - (c) Using a flat tool scrape off any carbon deposit in the combustion chamber. This was also fairly done by most candidates.
 - (d) By visual inspection, the cylinder head gasket is examined if burnt or torn out. Perfectly done by candidates.
 - (e) Most candidates did not know the causes of carbon deposit in the cylinder head.
 - (f) The method of placing the cylinder head on the engine block, the selection of the correct tools to be used and the process of re-tightening were not well done by candidates.

QUESTION 2

From the vehicle provided:

- (a) **Remove one rear wheel specified by the examiner.
Report to the examiner.**
- (b) **Remove the brake drum and examine its inner part.
Report to the examiner.**
- (c) **Examine the brake shoes.
Report to the examiner.**
- (d) **Check the condition of the brake springs.
Report to the examiner.**
- (e) **Adjust the brake.
Report to the examiner.**
- (f) **Answer two relevant questions from the examiner.
Report to the examiner.**
- (g) **Refit the brake drum.**

Report to the examiner.

(h) Refit the road wheel.

Report to the examiner.

- (a) Candidates lacked the correct techniques of slackening road wheels and in some cases could not select the right tools for the task.
- (b) Quite a good number of candidates were able to remove the brake drum. Using either a flat or star screw driver or a spanner of the correct size the brake drum is removed in order to gain access to the brake shoes.
- (c) This was properly done by most candidates.
- (d) Well done by all candidates.
- (e) Most candidates could not select the correct tool and did not know the correct process of adjusting brakes.
- (f) Answers to questions on brake operation and faults were not satisfactory.
- (g) & (h) Candidates had challenges in the correct process of refitting of brake drum and the correct process of road wheel re-tightening.

BUILDING CONSTRUCTION 2

1. **GENERAL COMMENTS**

The standard of the paper compared favourably with that of the previous year. Candidates' performance was slightly better than that of the previous year. It was above average performance.

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

- (1) Attempted questions were clearly numbered for easy identification.
- (2) Handwritings were legible enough.
- (3) Most candidates answered new questions on fresh pages.
- (4) Sub-questions for a particular question number followed in order as required.
- (5) Answers supplied by some candidates were in a logical manner indicating improvement in performance.

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

Candidates' weaknesses include:

- (1) Poor spelling of words.
- (2) Re-copying of the questions into the answer booklet without providing answers.
- (3) Provision of unrelated responses to questions.
- (4) Poor use of technical terms and jargons.

4. **SUGGESTED REMEDIES**

- (1) Candidates should take their preparation period for the examination very serious. They should have time to read and practise sketches so as to acquire the skills needed.
- (2) Teachers should give exercises and teach students how to answer them.
- (3) Candidates should be encouraged by their teachers to use the appropriate technical terms and jargons in their writings.
- (4) Students should visit construction sites to link theory to practice.

5. **DETAILED COMMENTS**

QUESTION 1

- (a) **State three reasons for finishing a concrete floor with a cement sand screed.**
- (b) **With the aid of a sketch, illustrate the method of laying drain pipe using a gauge board and a spirit level.**

(c) State two safety precautions to be taken in carrying out electrical installation work in a domestic building.

- (a) Reasonable answers were given, yet some were of the view that the cement-sand screed prevents plant growth; beautifies the building and also increase the strength of the floor concrete.
- The provision of floor concrete is to prevent plant growth and not the screeding work.
 - The floor screed rather beautifies the floor and not the building.
 - The strength of the concrete cannot be altered by the application of the floor screed.

Some of the expected answers were:

- It is cheap.
- It has the ability to resist indentation.
- It is hand wearing.
- It is easy to lay or place in position.
- It is easy to produce on site.
- It can be laid to any thickness required.

- (b) Some candidates were able to sketch correctly, but most candidates sketched something different. A correct sketch should illustrate the following items in place:

- A drain pipe placed on pegs.
- A gauge board with a tapered side placed on the drain pipe.
- A spirit level placed on gauge board.
- The slope is determined by adjusting the pegs where necessary.

- (c) Some of the answers given by candidates were:

- Cover all electrical cables/wires.
- Put off all gadgets.
- The meter should be put off.
- Plugs should be tight.

The above answers did not satisfy the demands of the question because:

- Covering the electrical cables/wires were vague.
- Cable used for domestic installation work are already sheathed.
- Electrical gadgets are not part of the installation work.
- A meter in a domestic installation is only used for measuring consumption of power used.
- Fixing wall plugs play no part in an installation work.

Some required answers are:

- Use sheathed wires or cable for the work.
- Provide fuse to check overload.
- Provide earthen wire to check stagnant current.

- Use of correct wire sizes for installation.

QUESTION 2

- (a) **State two reasons for providing temporary support to sides to excavation.**
- (b) **List four desirable properties of aggregates for the production of concrete.**
- (c) **Sketch a cross-section through a retaining wall and indicate the following:**
 - (i) **heel;**
 - (ii) **toe;**
 - (iii) **weep hole;**
 - (iv) **retained earth.**

- (a) Good answers like
 - Preventing the sides of the trench from caving in.
 - To give protection to men working in the trench.
 - Safety of adjoining properties while the excavation remains open for a long time.
 - When the excavation is deep.
 - Where the soil is loose.were given:

However wrong answers like

- Supporting the foundation
 - Making the foundation straight and preventing rainwater into the trench
- were stated by some candidates.

- (b) The question examined candidates on four desirable properties of aggregates for the production of concrete. The term aggregates was used for both fine aggregate and coarse aggregate.

Property of an aggregate means either quality or distinctive feature(s) that must be taken into consideration before using the aggregate.

Some of the properties looked for are:

- Should be clean.
- Should have a satisfactory strength.
- Must be durable.
- Must be well graded.
- Must be inert
- Free from impurities.

Some candidates stated function of aggregates in a concrete mix instead of the properties.

- (c) The required answers for the question were:

- a retaining wall either in concrete or sandcrete brick/blockwall.
- introduction of weephole to reduce pressure behind the wall.
- indication of ground level.
- portion of the retained earth.
- heel and toe of the concrete foundation.

Sketches produced by candidates were not concise and therefore could not measure to what were expected.

Some foundations for the retaining wall were horribly sketched. Retaining walls were not properly presented. Some did not have foundations to support the wall.

Ground level was shown at the top of the retaining wall defeating the purpose for erecting a retaining wall.

The position of the weephole in the wall could not drain water behind the wall to reduce water pressure.

QUESTION 3

- (a) **List five walling materials for a domestic building.**
- (b) **State one advantage each for the use of the following:**
- metal window frames;**
 - timber window frames.**
- (c) **Fig. 1 shows the sketch of a section through a closed eaved roof. Identify the parts labelled M, N, O, P, Q and R.**

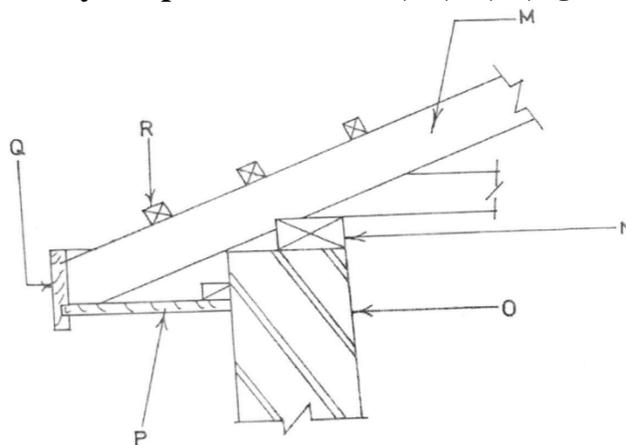


Fig-1

- (a) Some of the required materials are:
Sandcrete block/brick, plastic, metal, glass, concrete, clay brick, stone, bamboo, timber and adobe blocks.

Surprisingly, candidates listed tools for laying walls. Other examples of wrong answers listed were: sand, gravels, paint, nails, reinforcement bars and clay.

- (b) Good answers were given or stated for one advantage each for the use of metal window frame.
- (c) Candidates could identify the elements in the closed eaved roof asked for. Nevertheless, some could not spell the names of the elements correctly. Others recopied the sketch into their booklets.

QUESTION 4

(a) State one function each of the following in a water-closet cistern:

- (i) ball valve;**
- (ii) overflow pipe.**

(b) Sketch to illustrate a double-bowl kitchen sink.

(c) State three functional requirements of an inspection chamber.

- (a) (i) Satisfactory answers were given by some candidates. Yet, some thought that the ball valve operates as the flushing arm or the overflow pipe.
The only function of the ball valve is to control the water supply in a cistern.
- (ii) The overflow pipe takes excess water from the cistern to a convenient place to avoid flooding in the room and not a service pipe or a supply as stated by some candidates.
- (b) The sketch of a double-bowl kitchen sink was partially produced. The draining board of the sink extends on both the left hand side and the right hand side and not just bowls without draining board. Each bowl has a hole in it to drain water. Some bowls were without holes to drain off water.
- (c) Some functions of an inspection chamber are:
 - to exclude sub-soil moisture into the tank.
 - be water-tight to prevent leakage of the foul water in the tank.
 - allow access into drain for inspection.
 - allow access into drain for inspection and cleansing.

Some perfect expressions were made with regard to the demand of the question. Answers relating to constructional requirements of an inspection chamber were wrongly supplied as answers to the question.

QUESTION 5

(a) Sketch the conventional symbol for each of the following:

- (i) bath tub;**
- (ii) switch socket outlet;**
- (iii) kitchen sink;**
- (iv) water closet.**

(b) State causes of accident on site.

- (a) The performance indicates that candidates were not abreast with the use of symbols. Some reasonable sketches were made for bath tub and switch socket outlet. Incomplete sketches were also made for the kitchen sink and the water closet. Some sketches could not be explained or construed.
- (b) Moderate answers were given for the three causes of accident on site. The question looked at causes of accident on site and not effect of accident on site.

BUILDING CONSTRUCTION 3

1. **GENERAL COMMENTS**

The paper compared favourably with that of the previous year. The pattern of questioning, difficulty or flexibility of structure has not changed. Candidates' performance was average.

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

Candidates demonstrated the following strengths:

- (1) Most candidates numbered their responses very well and arranged their work neatly.
- (2) Almost all the questions were attempted by the candidates.

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

These include:

- (1) Poor spelling of words and technical terms.
- (2) Poor sketches of objects and inappropriate methods of labelling objects.
- (3) Poor indication and use of dimensioning lines and arrows.
- (4) Lack of understanding of the questions in their context.
- (5) Inability of candidates to use the appropriate technical terms and jargons.

4. **SUGGESTED REMEDIES**

- (1) Candidates should be encouraged to read wide on the subject.
- (2) More exercises should be given to student to practise how to sketch and label parts of objects.
- (3) Teachers should endeavour to complete the syllabus with students before they sit for the examination.
- (4) Teachers should use the technical terms and jargons in their lessons and encourage students to use them.

5. **DETAILED COMMENTS**

QUESTION 1

Fig. 1 shows a pictorial sketch of part of a building built with sandcrete block walls and corrugated roofing sheets. Use it to answer the following questions:

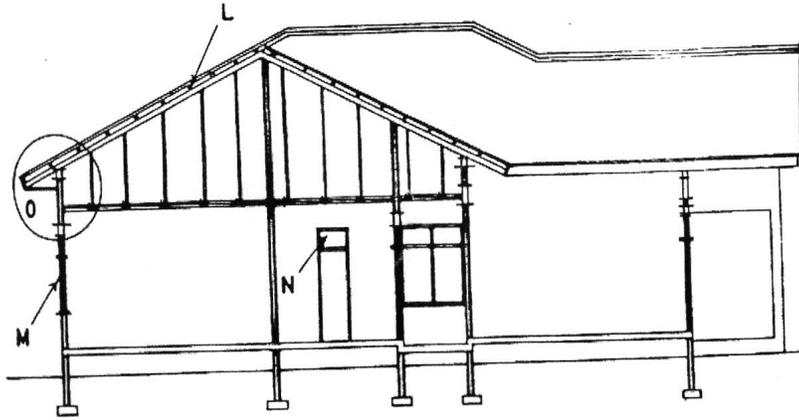


Fig.1

- (a) (i) Identify the elements labelled L, M, and N.
(ii) State one function of each of the elements labelled in (a)(i).
- (b) Sketch to illustrate how the subsoil moisture is prevented from getting to the top of the ground slab and label the following elements:
(i) external wall;
(ii) damp proof course;
(iii) damp proof membrane;
(iv) concrete foundation;
(v) external render;
(vi) sand blinding.
- (c) Show the constructional detail at O, to illustrate how birds are prevented from getting into the building and label any two parts.
- (d) A framed, ledged braced and battened door is used for the garage. Sketch a vertical section through the door and label the following:
(i) frame;
(ii) ledge;
(iii) brace;
(iv) batten.
- (a) (i) Candidates answered well.
(ii) Responses were good though a few deviated in the answers.
- (b) The exact positions of the damp proof course, damp proof membrane, sand blinding and finished ground levels were poorly located on the sketch.
- (c) Sketching was poor. Actual positions of requested roof members were not well indicated.
- (d) Majority of the candidates produced the elevation of the braced batten door instead of the cross-sectional details asked for. Many more presented panel doors for answers.

QUESTION 2

- (a) **State four advantages of using precast concrete over in-situ concrete in lintel construction.**
- (b) **Sketch a cross-section through a pad foundation and label the following parts:**
 - (i) **main reinforcement in column;**
 - (ii) **stirrup in column;**
 - (iii) **main reinforcement in foundation;**
 - (iv) **concrete in pad foundation.**
- (c) **A trench measuring 2000 mm deep and 450 mm wide is to be excavated in a moderately firm soil. State two factors that would necessitate the use of mechanical plant for its excavation.**

- (a) Candidates' responses lacked the needed technical substance. There was clear evidence that candidates knew very little about precast components and its construction.
- (b) Generally, candidates' sketches were poor. The reinforcement elements were poorly sketched and their positions wrongly indicated on the sketch.
- (c) Quite a good number of candidates who attempted this question seemed not to have understood the question and its context. There was much deviation. Candidates' answers mostly centred on the nature of soil.

QUESTION 3

- (a) **Sketch to illustrate how the following operations are carried out when bonding blockwalls:**
 - (i) **plumbing the edge of a wall;**
 - (ii) **levelling the top of a wall.**
- (b) **State five processes required to cast a solid ground floor slab on a compacted hardcore filling.**

- (a) The bonded walls was well sketched. Majority indicated the required operations using the appropriate tools.
- (b) Majority could not answer the question well. This area of the syllabus needs to be revisited.

QUESTION 4

- (a) **State one reason for each of the following site practices:**
 - (i) **erection of site hutments;**
 - (ii) **providing a first aid box on site;**
 - (iii) **a visit by the factories inspectors to the site.**
- (b) **State the purpose for providing each of the following drainage facilities:**
 - (i) **soakaway pit;**
 - (ii) **septic tank;**
 - (iii) **water closet sanitary fitting.**
- (c) **State two methods of jointing P.V.C. drain pipes.**
- (d) **List two types of safety clothing to be worn when performing each of the following operations:**

- (i) **placing concrete in an upper floor;**
 - (ii) **digging of foundation trench.**
- (a) (i) Good responses.
 - (ii) Good attempts with good responses.
 - (iii) Majority of candidates answered wrongly. Most responses described the job of the Building Inspector or Clerk of Works.
- (b) (i) Responses was generally poor.
 - (ii) Very poor responses. Most candidates exchanged water resevoirs with the septic tank.
 - (iii) Candidates could not answer well.
- (c) Answers were not good. Candidates lacked in-depth knowledge of the topic.
- (d) Good responses but poor spelling of the names of the element dominated.

QUESTION 5

- (a) State four functional requirements of a roof.**
- (b) State four factors that affect the quality of clay bricks during manufacture.**
- (c) State four reasons for the use of a kerb in access road construction.**

- (a) Good attempt with good responses.
- (b) Most answers given by candidates were wrong.
It is as if most candidates did not understand the question and its context. as indicated earlier.
- (e) The topic on road kerbs will need an emphasis and treatment. This is because abstract responses were received. Many indicated that road kerbs prevent accidents on the road, etc.

QUESTION 6

- (a) Sketch the plan of each of the following types of stair:**
 - (i) open well;**
 - (ii) dog leg.**
- (b) Explain two methods of curing concrete on site.**
- (c) Explain the difference between a balustrade and baluster.**
- (d) State the main reason for covering steel reinforcement bars on site.**

- (a) Majority provided the required sketch. A few however went ahead to sketch sectional views thereby deviating.
- (b) Two methods of curing was poorly answered. The problem was with the explanation.

- (c) The difference between balustrade and balusters were not well answered.
- (d) This question was well answered by the majority who attempted.

ELECTRONICS 2

1. **GENERAL COMMENTS**

The standard of the paper was good and compared favourably with that of the previous years.

Performance of the candidates compared with that of the previous year was poor.

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

- (1) Some of the candidates had in-depth knowledge of classes of amplifiers and combinational logic circuit.
- (2) Some of the candidates too were able to recall the difference between transistors and valves correctly.
- (3) Some of the candidates had fair knowledge in the use of oscilloscope.

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

- (1) Majority of the candidates did not demonstrate knowledge and understanding in Electronics.
- (2) Majority of the candidates did not answer their questions satisfactorily.
- (3) Most candidates had difficulty in drawing circuit symbols correctly.
- (4) Most of the candidates did not prepare adequately for the examinations.
- (5) Most candidates exhibited weakness in the definition of laws.

4. **SUGGESTED REMEDIES**

- (1) Candidates should be taught the techniques of answering questions.
- (2) Candidates should read electronic textbooks widely to broaden their knowledge in the subject.
- (3) Some recommended Electronics textbooks should be made available to students.
- (4) Heads of Institutions must ensure adequate coverage of the syllabus Electronics before the examination.

5. **DETAILED COMMENTS**

QUESTION 1

- (a) **Draw and label the circuit diagram required to convert a galvanometer to**
 - (i) **an ammeter;**
 - (ii) **a voltmeter.**
- (b) **List four quantities that can be measured with the cathode ray oscilloscope.**

- (a) (i) Candidates' response to the question was fair. Some candidates were able to draw and label the circuit diagram required to convert a galvanometer to an ammeter correctly while others could not. The overall response to the question was fair.
- (ii) Most of the candidates could not draw and label the circuit diagram correctly. Candidates lacked knowledge in this direction and the overall performance was poor.
- (c) Candidates' response to this question was fair. Some candidates were able to list the four quantities correctly.

QUESTION 2

- (a) **State Kirchhoff's current law.**

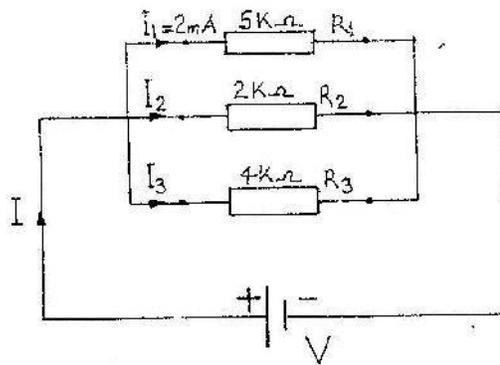


FIG. 1

- (b) **In figure I, calculate**

- (i) V ;
(ii) I_2 ;
(iii) I_3 ;
(iv) I .

- (a) Candidates' response to the question was fair. While some candidates defined the law accurately, others were found wanting. However, the overall response to the question was fair.
- (b) Some candidates exhibited knowledge in calculating voltage and branch currents. Other candidates exhibited weakness in that direction. The overall performance of candidates was fair.

QUESTION 3

- (a) **Define electric field strength.**
- (b) **Draw the circuit diagram of a**
- (i) **charging capacitor;**
- (ii) **discharging capacitor.**

- (a) This question was not popular among candidates. Majority of the candidates could not define electric field strength correctly. Candidates have very little knowledge in this area. The overall performance was very poor.
- (b) (i) This question was also not popular among candidates. Majority of candidates could not draw the circuit diagram of a charging capacitor correctly. Candidates lacked knowledge in this area (CR circuit) Candidates' performance was also very poor.
- (ii) Majority of the candidates exhibited the same weakness as in 3(b)(i). Candidates' performance was very poor.

QUESTION 4

- (a) **List four classes of amplifiers.**
 - (b) **State the class of amplifier with the**
 - (i) **least collector efficiency;**
 - (ii) **highest collector efficiency.**
 - (c) **Draw and label the circuit diagram of an inverting operational amplifier.**
- (a) This question was popular among candidates. The overall performance of candidates was very good.
 - (b) (i) Majority of the candidates lacked knowledge in the area of amplifiers and their efficiencies. Most candidates performed poorly. Candidates could not respond to the question.
 - (ii) Majority of the candidates lacked knowledge in this area as well. The overall performance of candidates was very poor.
 - (c) This question was not popular among candidates. Majority of the candidates could not draw and label the circuit diagram of an inverting operational amplifier. Candidates lacked knowledge in this area. The overall performance of candidates was very poor.

QUESTION 5

- (a) **State four advantages of the transistor over the thermionic valve.**
- (b) **Draw and label the circuit symbol of a P-channel field effect transistor.**
- (c) **A transistor amplifier connected in common emitter mode has a collector load resistance of 2,000 Ω . If the short-circuit current gain (h_{fe}) of the transistor is 100, and its input resistance (R_{in}) is 1,000 Ω . Calculate the voltage gain.**

- (a) Some candidates were able to list four advantages of transistor over thermionic valve correctly. On the other hand, some candidates fell short in this direction. The overall performance of candidates was fair.
- (b) Most candidates could not draw and label the circuit symbol of a P-channel FET.
- (c) This was not a popular question. Candidates exhibited lack of knowledge in voltage gain. Majority of the candidates performed poorly.

QUESTION 6

- (a) **Draw the**
 - (i) **Combinational logic circuit for the Boolean expression:**

$$F = \overline{AB + CD}$$
 - (ii) **Truth table for an EX – OR logic gate.**
 - (iii) **Circuit symbol of the EX – OR logic gate.**
- (a) (i) This question was fair to candidates. Some candidates were able to draw the combinational logic circuit correctly while some could not. The overall performance of candidates was good.
- (ii) Candidates' performance was average. Some candidates could draw the truth table of an EX-OR gate correctly. However, some could not live up to expectation.
- (iii) This question was not popular. Majority of the candidates could not draw the circuit symbol of EX-OR gate. Candidates' performance was very poor.

QUESTION 7

- (a) **Explain the effect of feedback in control systems.**
- (b) **Describe how thermostat in the following appliances provide feedback:**
 - (i) **Air conditioner;**
 - (ii) **Refrigerator.**
- (a) This was not a popular question. Candidates lacked knowledge in basic control systems. The overall performance of candidates was very poor.
- (b) (i) This was not a popular question. Majority of the candidates could not respond to the question. Candidates exhibited lack of knowledge in control systems. Candidates' performance in this question was very poor.
- (ii) This question was also not popular among candidates. Candidates exhibited lack of knowledge in control systems. Candidates' performance in this question was also very poor.

ELECTRONICS 3

1. GENERAL COMMENTS

The standard of the paper is comparable to that of the previous years. Candidates were allowed to use alternative components and apparatus where necessary. Performance of the candidates compared to that of the previous year was at par.

2. A SUMMARY OF CANDIDATES' STRENGTHS

- (1) Majority of the candidates understood the questions and the circuit diagrams and performed the two experiments.
- (2) Candidates followed the instructions and the steps as demanded in the two experiments.

3. A SUMMARY OF CANDIDATES' WEAKNESSES

- (1) Few candidates had negative current readings thinking that since Zener diode is reversed biased the readings will be in the reverse directions.
- (2) Most candidates did not apply the theory knowledge of the series connected resistors in a d.c. circuit.
- (3) Candidates lacked the understanding that varying a series bleeder resistance and varying a load resistance will affect the output voltage of a Zener diode.

4. SUGGESTED REMEDIES

- (1) Candidates should be exposed to more laboratory work to build their confidence and skill in practical activities.
- (2) Teachers should teach candidates how to select correct scales for drawing graphs from experimental results.

5. DETAILED COMMENTS

QUESTION 1

The aim of the experiment is to investigate the effect of varying load on the output of a Zener diode.

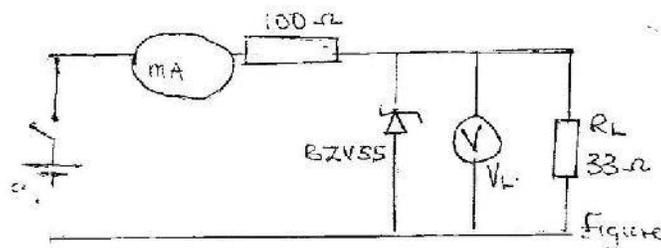


Figure 1

Table 1

R_L	V_L	$I(\text{mA})$
33 Ω		
47 Ω		
100 Ω		
1 k Ω		
10 Ω		

- Experiment one tested the effect of varying load on the output of a Zener diode.
- Few candidates were not able to read the ammeter correctly.
- Majority of the candidates obtained good results but were not able to plot accurate graphs.

- Performance was generally fair.

QUESTION 2

The aim of the experiment is to investigate the effect of varying the input voltage on the output of a Zener diode.

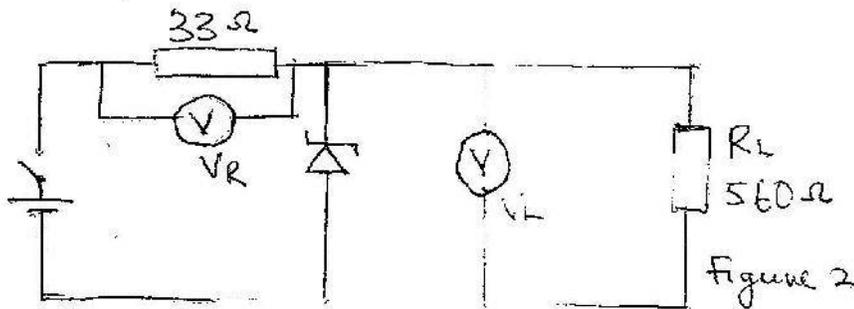


Table 2

$R(\Omega)$	$V_R(\text{V})$	$V_L(\text{V})$
33 Ω		
47 Ω		
100 Ω		
470 Ω		
1k Ω		

- Experiment two tested the effect of varying the input voltage on the output of a zener diode.
- Majority of the candidates did not obtain good results due to inability to read the instruments correctly.
- Candidates did not apply the theory knowledge of voltage divider rule as demanded in the experiment set up circuit.
- Performance was generally fair.

INFORMATION AND COMMUNICATIONS

TECHNOLOGY (ELECTIVE) 2

1. **GENERAL COMMENTS**

The standard of the paper compared favorably with the previous papers in the areas of content and level of difficulty.

The paper was well within reach of the candidates and the general performance was similar compared to that of last year.

2. **SUMMARY OF CANDIDATES' STRENGTHS**

- (1) In general, candidates responded to the questions as demanded by the rubrics.
- (2) A few candidates exhibited good knowledge of the subject matter.
- (3) A greater number of candidates expressed themselves much better in the English Language than exhibited before.
- (4) Only a few candidates answered all the questions or more than required, contrary to the situations of the previous examinations.

3. **SUMMARY OF CANDIDATES' WEAKNESSES**

The following were the main candidates' weaknesses identified:

- (1) Inability to appreciate the key requirements of the questions.
- (2) Apparent inadequate preparation.
- (3) Little or no evidence that candidates planned answers before writing them down.
- (4) Poor communication skills.
- (5) Some of the candidates had bad handwriting.
- (6) Some candidates demonstrated in their answers that they had 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 carefully use the Internet as a learning tool.

- (3) Candidates should avoid the use of inappropriate standards of communication such as those on the various social media platforms.
- (4) Candidates should plan to read through their answers to correct any errors as well as add further details.
- (5) Teachers of the ICT Elective subject should learn to adhere to the syllabus as much as possible.

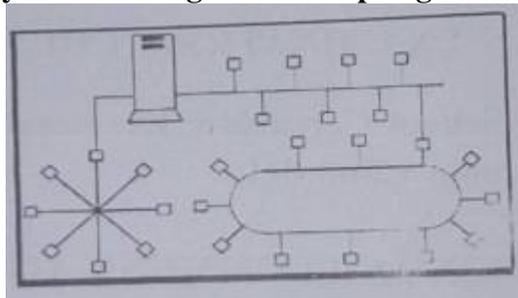
5. **DETAILED COMMENTS**

QUESTION 1

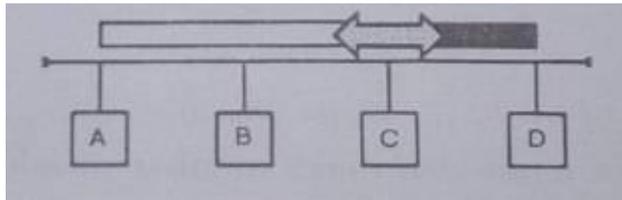
(a) What is *physical topology* with respect to computer networking?

(b) Identify the following network topologies:

(i)



(ii)



(c) Explain the topologies identified in 1(b).

A good number of the candidates answered (a) and (b) fairly well but (c) was poorly tackled by almost all the candidates. In the case of (c), candidates based their explanation on the way they saw the diagrams rather than the actual topologies. For instance, the hybrid was explained as a topology comprising a bus, star, and ring topologies. The bus was explained as comprising nodes connected to a cable in a straight line. .

The expected solution is as follows:

- (a) Physical topology is the layout/arrangement of computers/nodes in a network.
- (b) (i) Hybrid topology
(ii) Bus topology
- (c) (i) Hybrid topology is the combination of two or more of the primary topologies (i.e. bus, star, ring and mesh) to form a new network.
(ii) Bus topology is the physical arrangement of computers or nodes in a network such that each computer/node in the network is connected to a

common shared transmission medium.

QUESTION 2

- (a) **Explain *e-business*.**
(b) **State *three* benefits of e-business**

Almost all the candidates who attempted this question got the requirements entirely wrong.

E-business was taken to be e-commerce and the benefits were mainly on e-commerce. They failed to realize that e-commerce is only an aspect of e-business

The required solution is as follows:

- (a) Electronic business is the term used to describe the information systems and applications that support and drive business processes most often using web technologies.

E-business allows companies to link their internal and external processes more efficiently and effectively, and work more closely with suppliers and partners and better satisfy the needs and expectations of their business partners, leading to improvements in overall business performance.

- (b) **BENEFITS OF E-BUSINESS**

- It streamlines business processes with integrated back office systems.
- It reduces communication and travelling costs using online meeting tools and shared workspace.
- It maximizes lead conversion by using customer relationship management (CRM) systems to track and monitor interactions with prospects and clients.
- It improves supplier relations and productivity through collaborative tools and workspace.
- It benefits from license-free open source software.

QUESTION 3

- (a) **What is:**
(i) **relationship as used in database;**
(ii) **lookup field?**
- (b) **Explain the following database relationship types:**
(i) **one-to-one;**
(ii) **one-to-many;**
(iii) **many-to-many.**

This was the worst question answered by candidates. Although the syllabus includes the explanations of certain database terminologies including relationships, it was evident that candidates were either not taught well or decided to apply common sense approaches to answering the question.

The suggested solution is as follows:

- (a) (i) - A relationship establishes an association between common fields in two tables
- (ii) - A lookup field is an attribute that provides a list of values from which a user can choose an option.

- (b) (i) **One-to-one:**
This is an association between two tables in which each record in the first table contains a field value that corresponds to the field value of one record in the other table.

- (ii) **One-to-many:**
This is an association between two tables in which the primary key value in each record in the primary table (i.e. the one side of this relationship) corresponds to the value in the matching field or fields of many records in the related table.

- (iii) **Many-to-many:**
This is an association between tables in which one record in either table relates to many records in the other table.

QUESTION 4

- (a) **What is:**
 - (i) **computer port;**
 - (ii) **computer bus;**
 - (iii) **clock speed of a central processing unit (CPU)?**
- (b) **State *one* difference between:**
 - (i) **data bus and address bus;**
 - (ii) **magnetic disk and optical disc.**

There were only a few good answers to this question.

The expected solution is:

- (a) (i) A computer port is an interface between the computer and other computers or peripheral devices. Physically, a port is a specialized outlet on a piece of equipment to which a plug or cable connects.

- (ii) A computer bus is a pathway through which the processor communicates with the internal and external devices attached to the computer. Bus transfers the data between the computer subsystems and between the computers and sends the instructions to and from the processor and the different devices. It connects all

internal computer components to the main memory and the central processing unit.

- (iii) The clock speed of a CPU is the frequency at which the processor executes instructions or data are processed. This clock speed is measured in millions of cycles per second or megahertz.
- (b)
 - (i)
 - (1) A data bus carries data while an address bus carries instructions.
 - (2) A data bus carries the information that is going to be stored or read using the location the address bus gives to the memory. On the other hand, an address bus gives the memory instructions and where to place the actual data that it will store or read (map location).
 - (3) A data bus is bi-directional because bus transactions can be read or written. On the other hand, the address bus is uni-directional because no bus slave device ever provides an address on the address bus.
 - (4) The data bus specifies the data, send only while the address bus specifies the data, send and receive.
 - (ii)
 - (1) A magnetic disk requires a read/write head which does the reading and writing electromagnetically without the head touching the surface of the disk (except for the floppy disk). On the other hand an optical disc requires a laser beam of high frequency to write on one surface only and a beam of low frequency to read the data.
 - (2) A magnetic disk surface has a number of concentric tracks divided into sectors while an optical disc has a surface only a single spiral-shaped track.

QUESTION 5

- (a) **Explain *Internet chatting*.**
- (b) **What is a *cookie*?**
- (c) **List *four examples of browsers*.**

In (a), candidates realized the concept of communication but majority lost sight of the need for simultaneity. Part (b) attracted a few good answers but (c) was well answered.

Suggested solution for (a) and (b) are:

- (a) Internet chatting primarily refers to direct one-on-one communication or text-based group of communication in a half- duplex mode. Tools such as instant messaging applications are used.
- (b) A cookie is information that a web browser puts on a user's computer hard disk so that it can remember something about the user at a later time. It enables a website you often visit to recognize you if you visit it again.

INFORMATION AND COMMUNICATIONS

TECHNOLOGY (ELECTIVE) 3

1. **GENERAL COMMENTS**

The standard of the paper and that of the previous year examination is the same. It was noted that, candidates' performance is average compared to the previous year.

It has, however, been observed that performances continued to be localized even though the level has reduced, i.e. excellent performances are concentrated at some schools while bad performances are also concentrated at other schools.

2. **SUMMARY OF CANDIDATES' STRENGTHS**

- (1) Candidates were able to enter data.
- (2) Candidates were able to code HTML.
- (3) Candidates were able to create database.
- (4) Candidates query creations has improved.

3. **SUMMARY OF CANDIDATES' WEAKNESSES**

- (1) An insignificant few number of candidates used Microsoft Excel for the database application.
- (2) HTML files were saved as ".html.html" files
- (3) Candidates had difficulty with L1Query creation.

4. **SUGGESTED REMEDIES**

- (1) Teachers must cultivate logical reasoning skills in candidates to help in the development of programming skills.
- (2) 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.
- (3) 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 and cover significant aspects of the subject

5. **DETAILED COMMENTS**

QUESTION 1

HTML

The question required candidates to use a Text Editor to create an HTML web page. Candidates used text editors properly in coding the HTML. Majority of the candidates' performance on this question was good.

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 the head tag as some candidates portrayed in their work.. Even though an example of indentation has been given in the question, candidates still fail to indent properly.

The arrangement

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

has been given in the question as *an example*, yet candidates did not perform indentation. `<p>...</p>` 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.

The following is the solution of some candidates which is very good.

```
<html>
<head><title> CANDIDATE'S NAME INDEX NUMBER </title></head>
<body>
    <fieldset>
        <legend> Customer Name: </legend>
        <formaction="process.php" method="post">
        First Name:
            <inputtype="text" name="name"size ="30" /><br />
        Last Name:
            <inputtype="text" name="name" size="30" /><br />
        </form>
    </fieldset>
</body>
</html>
```

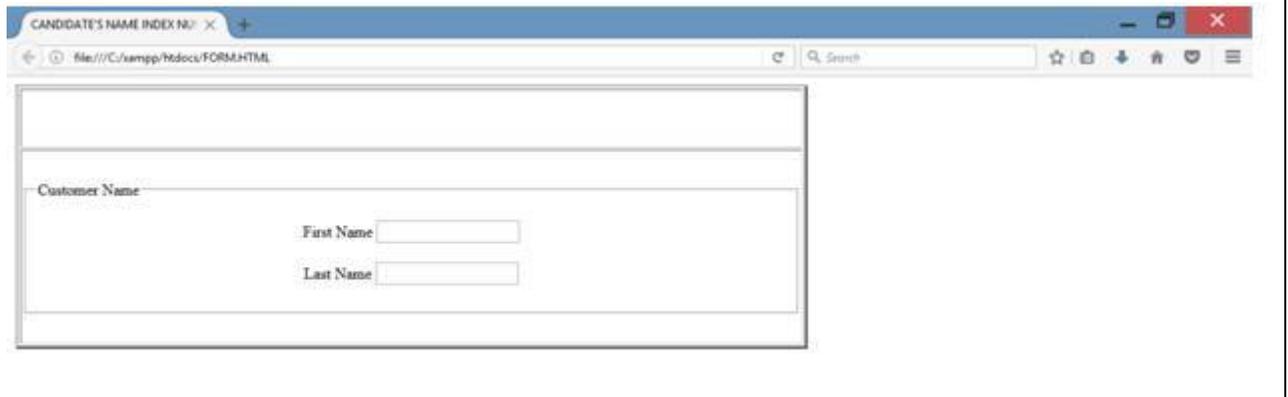
The expected coding with indentation is as follows:

```

1 <html>
2 <head>
3 <title> CANDIDATE'S NAME INDEX NUMBER</title>
4 </head>
5 <body>
6 <table border="0">
7 <tr>
8 <td width=800 height=60 </td>
9 </tr>
10 <tr>
11 <td width=800 height=200>
12 <fieldset>
13 <legend> Customer Name </legend>
14 <p align="center">
15 First Name <input type="text" > <br><br>
16 Last Name <input type="text" >
17 </p>
18 </fieldset>
19 </td>
20 </tr>
21 </table>
22 </body>
23 </html>
24

```

DISPLAYED OUTPUT IN BROWSER



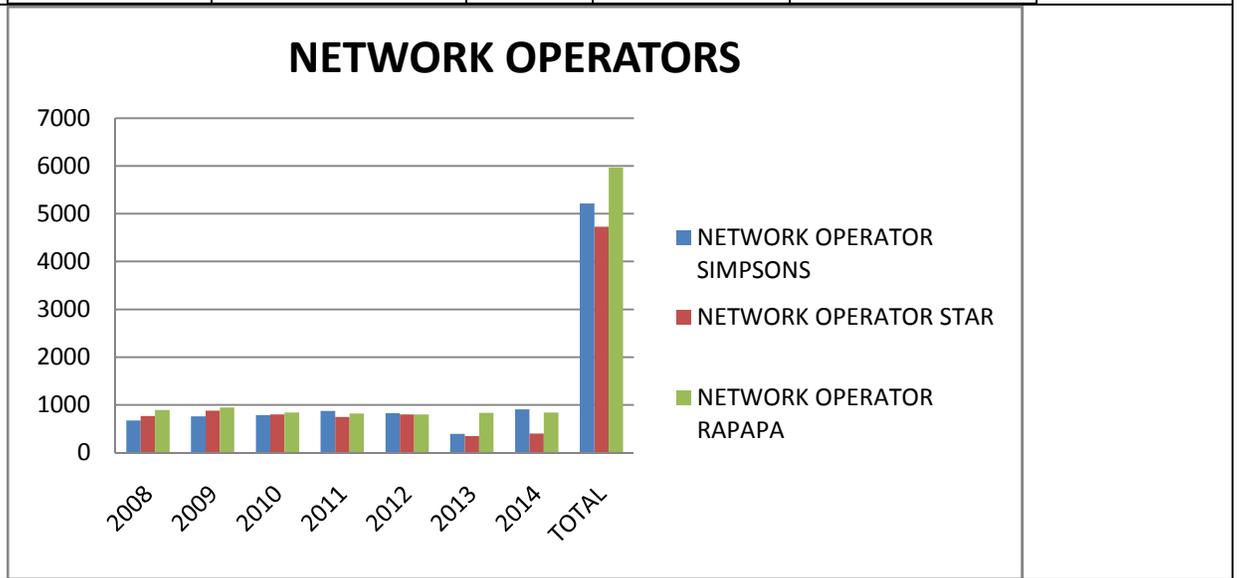
QUESTION 2

EXCEL

Candidates were on the average able to carry out this work except a few.

Candidate solution 1				
YEAR	NETWORK OPERATOR			GRANDTOTAL
	SIMPSONS	STAR	RAPAPA	
2008	673	764	894	
2009	761	876	948	
2010	788	797	837	
2011	872	747	821	
2012	827	802	797	
2013	392	347	833	
2014	903	399	837	
TOTAL	=SUM(B3:B9)	=SUM(C3:C9)	=SUM(D3:D9)	=SUM(B10:D10)

Result				
YEAR	NETWORK OPERATOR			GRANDTOTAL
	SIMPSONS	STAR	RAPAPA	
2008	673	764	894	
2009	761	876	948	
2010	788	797	837	
2011	872	747	821	
2012	827	802	797	
2013	392	347	833	
2014	903	399	837	
TOTAL	5216	4732	5967	15915



This bar chart includes the Totals as part of the operators. This is however **not** the requirement of the question.

QUESTION 3

DATABASE

- (1) The requirement is to use a database application to create a database and name it DATA in the folder created.

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.

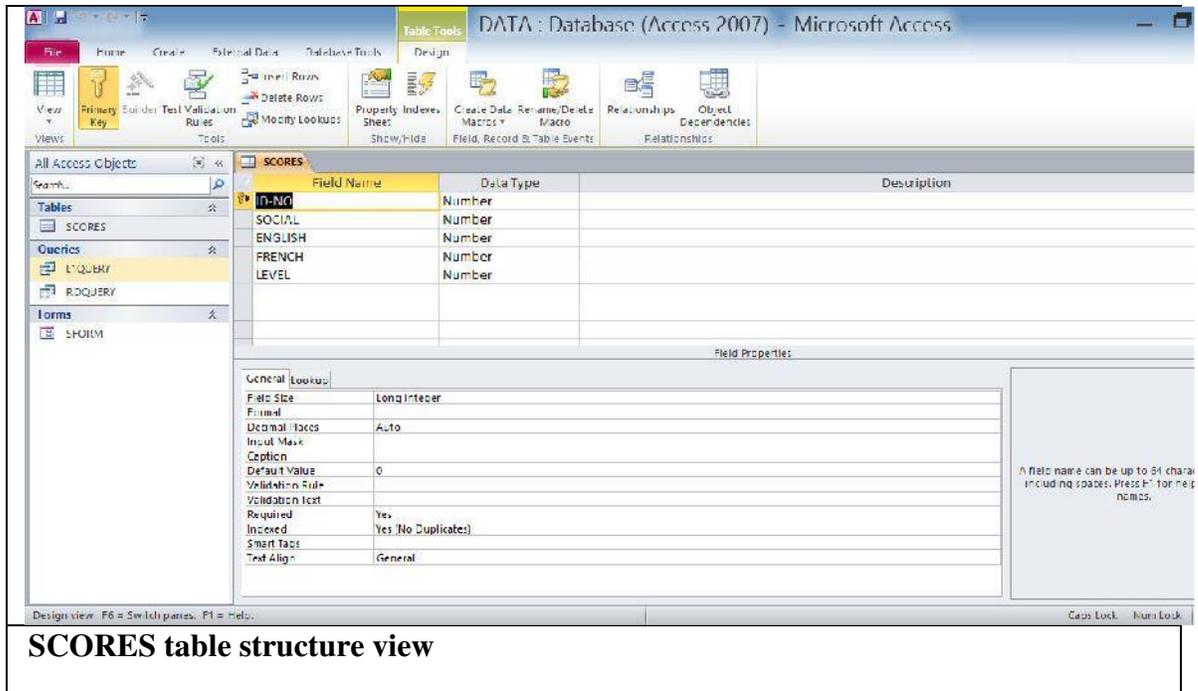
Some candidates used Microsoft Excel to answer this question which was wrong because Microsoft Excel is not a database application for this examination.

- (2) The table created required appropriately defined fields. Defining the fields appropriately implies that the field names must be correct and their data types and data size must be correct. A table with a wrong field data type is not a correct table.

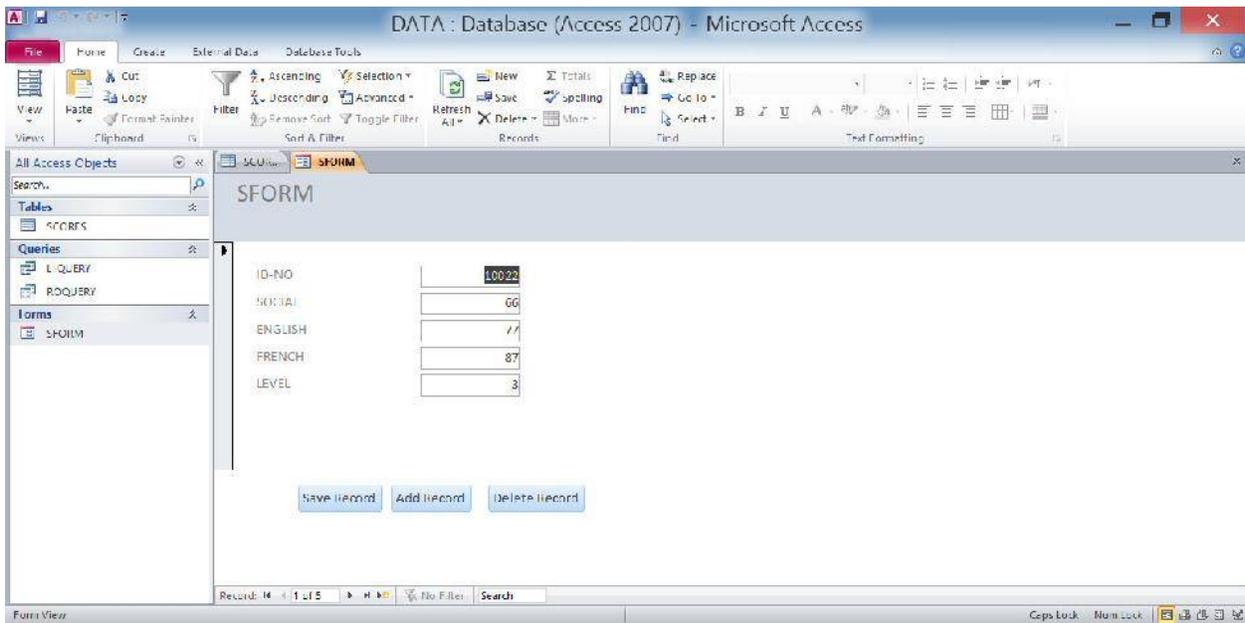
Some candidates did not name the tables properly. Others also defined all fields as type Text which was also not correct in some instances.

- (3) A form is also to be created for entry into the table. Majority of the candidates created the form correctly.

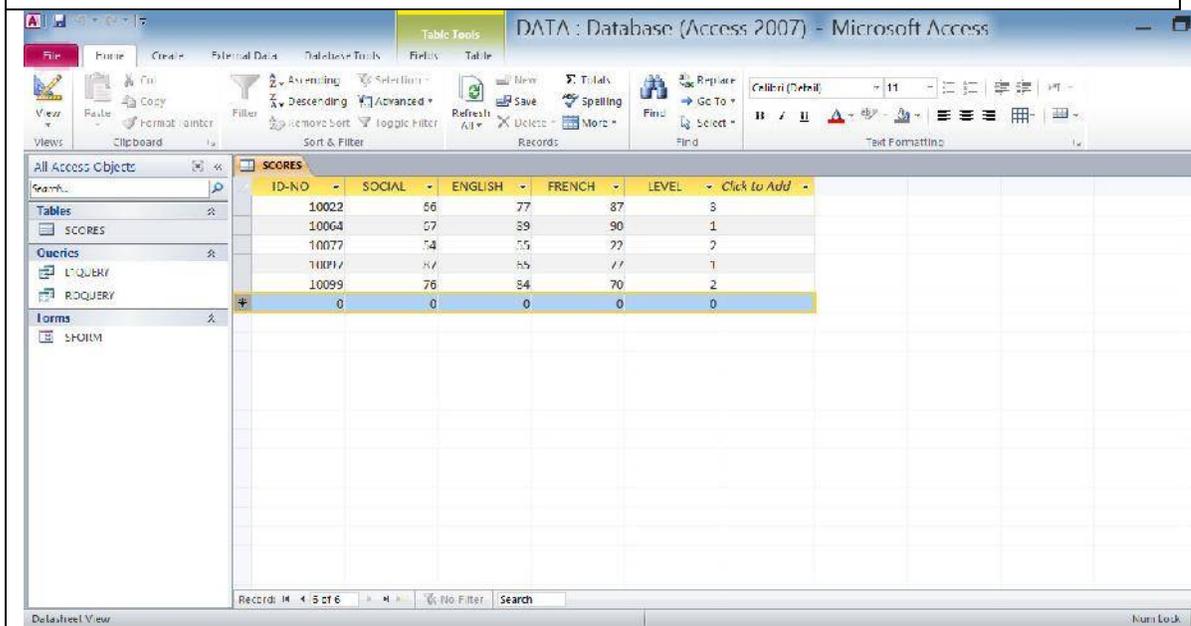
The general performance on this question was poor.



A form is to be created and used for the data entry. The snapshot of a typical form is shown below.



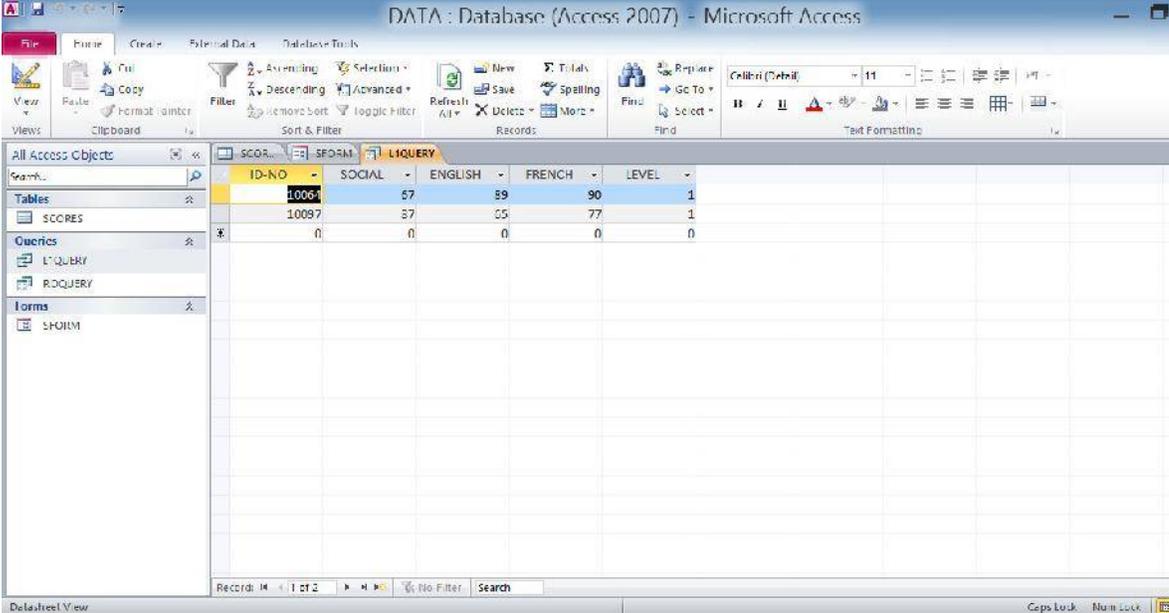
Form -SFORM



After entering data, table SCORES will look as above.

Query L1QUERY

The following snapshot show various types of attempts by candidates to execute Query L1QUERY



The screenshot shows the Microsoft Access interface with the 'L1QUERY' query open in Datasheet View. The table contains the following data:

ID-NO	SOCIAL	ENGLISH	FRENCH	LEVEL
10064	57	89	90	1
10087	87	65	77	1
0	0	0	0	0

Query L1QUERY output not well arranged as required by the question.

Its appropriate SQL query view looks as follows:

```
(SELECT SCORES.[ID-NO], SCORES.SOCIAL, SCORES.ENGLISH, SCORES.FRENCH, SCORES.LEVEL  
FROM SCORES WHERE (((SCORES.LEVEL)=1));)
```

METALWORK 2

1. **GENERAL COMMENTS**

The standard of the paper compares favourably with that of previous years. All the questions were within the syllabus and satisfied all requirements. However, like previous years, most candidates could not perform well.

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

- (1) A few candidates provided quality answers and performed creditably. Their answers were straight to the point, orderly and accurate.
- (2) An appreciable number of candidates adhered to the rubrics of the paper as they attempted only the required number of questions.

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

- (1) Inadequate preparation and lack of understanding of the subject matter.
- (2) Inability to understand the requirements of some questions. Some of the candidates simply set their own questions and answered them.

4. **SUGGESTED REMEDIES**

- (1) Teachers and candidates should ensure that they cover the entire syllabus and have enough time for revision.
- (2) Candidates should be given more assignments to do in class and at home.
- (3) Teachers should monitor learning activities of candidates.

5. **DETAILED COMMENTS**

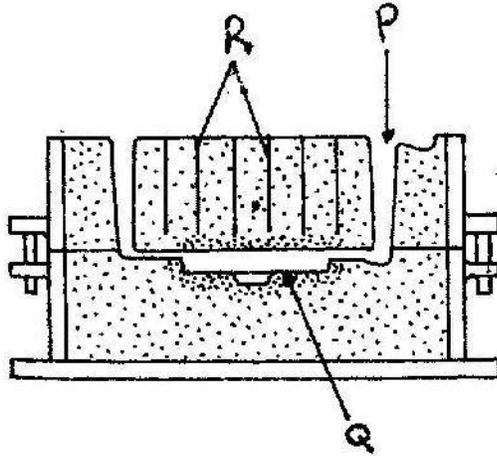
QUESTION 1

- (a) **State the reason why files without handle should not be used.**
 - (b) **Sketch an odd-leg callipers.**
 - (c) **Describe the production of pig iron with reference to the following:**
 - (i) **the furnace used;**
 - (ii) **the charge;**
 - (iii) **the impurities.**
 - (d) **State two properties of each of the following:**
 - (i) **cast iron;**
 - (ii) **steel.**
- (a) A popular question. Many scored average marks as they provided good responses.
- (b) Answers to sketching an odd-leg callipers was satisfactory.

- (c) (i) Answers provided by most candidates were not satisfactory. In pig-iron production, a blast furnace is used.
- (ii) In the production of pig iron, the charge consists of iron ore, coke and limestone, however majority of the candidates who attempted this question appeared to know nothing about the charge.
- (iii) Performance was not satisfactory, because candidates failed to include the following impurities: Sulphur, Silicon, Phosphorous, Manganese which combine with limestone to form slag.
- (d) Candidates were able to state two properties correctly.

QUESTION 2

- (a) The sketch below shows a profile of a sand mould.



- (i) Identify the parts labelled P, Q and R.
- (ii) State the function of the parts labelled P and R.
- (b) State one effect of each of the following:
 - (i) using a pinned file;
 - (ii) too great a cutting speed;
 - (iii) too long a rivet tail;
 - (iv) drill bit ground off-centre.
- (a)
 - (i) The parts were P-spruehole, Q-cavity and R-vent holes. Performance was average.
 - (ii) Answers provided by most candidates to this question were satisfactory.
- (b) Majority of the candidates rightly gave one effect each of the following:
 - (i) using a pinned file – it will prevent effecting cutting.
 - (ii) too great a cutting speed – it will cause overheating.
 - (iii) too long a rivet tail – the tail will bend and prevent proper head formation.
 - (iv) drill bit ground off-centre – it produces an oversized hole.

QUESTION 3

- (a) (i) **Explain the term design brief.**
- (a) (ii) **State two reasons for writing specification in designing.**
- (b) **State three operations that can be carried out on the shaping machine.**
- (c) **State the difference between speed and feed in turning operation.**

- (a) (i) Only a few candidates answered this question. Most of them could not explain the term 'design brief'. It is a short statement that describes what the designer intends to do.
- (a) (ii) Some candidates could state two reasons for writing specification.
- (b) Majority of the candidates could not state three operations that can be carried out on the shaping machine. Candidates were required to state the following: Horizontal shaping, vertical shaping, groove cutting, keyway cutting and angular shaping.
- (c) This part of the question was poorly answered by most candidates. The difference between speed and feed in turning operation is: feed is the depth the drill penetrates into the work per revolution while speed is the circumferential distance the cutting edge of a tool moves per unit time.

QUESTION 4

- (a) **State one reason why the following heat treatment processes is carried out on metals.**
 - (i) **Normalizing;**
 - (ii) **Annealing;**
 - (iii) **Case hardening;**
 - (iv) **Tempering.**
- (b) **State one function each of the following:**
 - (i) **flux;**
 - (ii) **electrode.**
- (c) **State one safety precaution to be observed when welding with oxy-acetylene gas.**
- (d) **What is the filler metal for brazing?**

- (a) This was a popular question with some candidates giving a fairly good reason each why the heat treatment processes are carried out on metals. However, some candidates described the processes involved in the heat treatment processes which was not required.
- (b)(i)-(ii) Candidates could state one function each for flux and electrode.
- (c) Majority could state one safety precaution to be observed when welding with oxy-acetylene gas.
- (d) This part of the question was poorly answered. Candidates were expected to identify the filler metal for brazing, however, they gave wrong answers. The expected answer was spelter.

QUESTION 5

- (a) **State one result of each of the following when working on the centre lathe:**
- (i) **Cutting tool set too high above the centre line;**
 - (ii) **Cutting tool set too low below the centre line.**
- (b) (i) **List two striking tools used in sheet metalwork;**
- (ii) **Sketch any one of the tools listed in 5(b)(i);**
 - (iii) **Label two parts of the tool sketched in 5(b)(ii).**
- (c) **With the aid of a sketch, show the process of swaging in forging.**

(a) Candidates failed to answer this question properly. They were to state one result each when the cutting tool is set too high above the centre line and when the cutting tool is set too low below the centre line when working on the centre lathe. Majority of them provided sketches instead of stating the required result for each activity.

(i)-(ii) When the cutting is set too high above the centre line, it will increase the top rake angle and therefore decrease the front clearance angle. However, the front clearance angle is increased when the cutting tool is set below the centre line. Candidates should be taken through some of these activities on the lathe practically.

(b) (i) Candidates' performance was not encouraging. Some even listed cutting tools, holding tools and supporting tools. Candidates should identify all metal work tools used in the workshop.

(ii) The sketching of any one of the tools listed in 5(b)(i) was poorly done. Candidates should practise how to sketch objects.

(iii) A few candidates could label two parts of the tool sketched in 5(b)(ii).

(c) A few candidates could sketch the process. Some even sketched the sand mould, chiselling, hollowing, etc. It appeared that candidates had little knowledge of the process of swaging.

METALWORK 3

1. **GENERAL COMMENTS**

The general performance of candidates in this examination was satisfactory.

The standard of the paper and candidates' performance are comparable to those of previous years.

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

Candidates' strengths in the examination include:

- (1) attempting all parts of the exercise.
- (2) being specific about constructional details.
- (3) familiarity with the technical terminology and ability to interpret detailed drawings.
- (4) observation of workshop safety rules.
- (5) selections of appropriate tools and equipment as regards the performance of the exercise.
- (6) safe handling of all the selected tools and equipment used.
- (7) minimal spoilage of materials meant for the exercise.

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

Candidates' weaknesses in the performance of the test exercise include:

- (1) poor finish – burrs and sharp edges were left unremoved posing danger.
- (2) inaccuracies in work dimensions – ineffective manipulation of tools to obtain the desired shape and size.
- (3) poor hacksawing – cutting waste material more than expected.
- (4) poor chiselling - difficulty in cutting out slot.
- (5) poor drilling practices – contributing to misaligning of parts.
- (6) failure of marking out – to include dot punching of work part profile.
Obtaining the correct marked out shape of the work is necessary to work within the specified tolerance.

4. **SUGGESTED REMEDIES**

- (1) Candidates should be encouraged to adopt correct fitting practices.
- (2) Candidates should be provided with all the tools required in the expected knowledge and skills acquisition.
- (3) Candidates should be engaged in regular practical work in the school workshop.

- (4) The teachers in charge, should help students to develop good taste for accurate products.

5. **DETAILED COMMENTS**

Two questions were given to form the paper.

Question 1 was designed to involve the necessary fitting skills in line with the specified syllabus.

QUESTION 1 -FITTING EXERCISE

Candidates were supplied with one flat mild steel plate, 102 mm x 62 mm x 3 mm; one flat mild steel plate, 62 mm x 52 mm x 3 mm; one flat mild steel plate 72 mm x 62 mm x 3 mm and mild steel rod 6 mm x Ø4 mm – 4 off to prepare a fitting exercise in order to produce the article shown in a given assembly. They also showed the detailed views of each part required in the fitting exercise.

PART A

Candidates were expected to cut and file the given mild steel plate to size 100 mm x 60 mm x 3 mm to obtain the shape indicated in part A view.

PART B

Candidates were required to mark out and dot punch to obtain the size and shape shown in the detailed view of part B. The shape should be obtained hacksawing, chiselling and filing through the marked out lines.

PART C

Again, candidates were expected to mark out per the given dimensions on the Part C. The lines should be further dot punched to indicate clearer lines to be cut through hacksawing.

The cut out piece should be carefully filed to the specified dimensions to obtain the required size and shape.

All the parts produced ought to be assembled together and drilled in the marked out positions with 4 mm drill.

Candidates were finally required to prepare four pins per the dimension indicated on the part labelled D.

The pins ought to be prepared such that they could be smoothly inserted into the four drilled holes to obtain good transition fit.

Many candidates worked out to obtain all parts with purposeful diligence and were able to score high marks for their performance.

However, candidates could do more by paying much attention to final finishing of the article produced.

QUESTION 2 - MACHINING EXERCISE

Question 2 was also designed to cover the machining aspects of the syllabus – it covered wide range of skills in machining – using the lathe machine in particular.

Candidates were supplied with one piece free cutting mild steel rod, Ø50 mm x 100 mm to produce the machine part shown in detailed view.

Candidates were expected to turn the rod down to 40 mm diameter and face at both ends to the given length of 76 mm. The work could be held in the four jaw chuck and further turned down to diameter 30 mm to 50 mm length from one side, allowing 26 mm length to 40 mm diameter remain in the chuck to be finally finished to the knurled shape.

The projected end ought to be machined to the given taper to a length of 30 mm.

After machining both the parallel shoulder and the taper, the workpiece could be changed so that the parallel stem is held in the chuck to enable both the undercut and the knurling to be performed

After these operations had been performed, the two chamfers should be produced to the stated dimension – 2 mm x 45° to make the ends of the diameter 40 mm x 26 mm length safe and neat.

Very unfortunately, no candidate attempted this particular question.

TECHNICAL DRAWING 2

1. **GENERAL COMMENTS**

The standard of the paper for this year was on the average as compared with the previous years. All the questions were within the syllabus. General performance of candidates was on the average.

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

- (1) All the given views were drawn to the correct dimensions.
- (2) Lineworks were accurate.
- (3) Outline were clearly identified from the projection or construction lines.
- (4) The plan of the square pipe was drawn to perfection and the development was done accurately using the given seam.
- (5) The construction of the true shape of the lamina was well done.
- (6) The plan and end view of the truncated right cone were done neatly and accurately.

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

- (1) The given figure showed intersection of two square pipes but candidates drew elevation of two cylindrical pipes. The plan was produced as two circular pipes and the development was in the form of that of a cone.
- (2) The two views of the lamina were constructed wrongly. Some candidates extended lines from the apex at random at both sides of the plan and drew perpendiculars to the extended lines without further construction.
- (3) After the construction of the given elevation, the cutting plan was wrongly placed. The cutting plana was either placed at 30° or 45° without using the given heights.
- (4) Some candidates constructed the hexagon across corners with the side 40 mm on the horizontal. After drawing the auxiliary line X, Y, some were unable to transfer the various dimensions on the plan to construct the auxiliary view.
- (5) The conversion of the length of the beam, 2 m to the given scale 1 mm = 0.1 m was poorly done. Likewise, candidates could not construct the force line to the correct scale of 1 mm = 0.5 kN, thus the force diagram was poorly done, that affected the furnicular/link polygon. Some candidates failed to draw parallel line to a point on the force line which determined the magnitude of parallel to a point on the force line which determined the magnitude of the reactions.
- (6) Shear force diagram was constructed instead of bending moment.

4. **SUGGESTED REMEDIES**

- (1) Candidates should read the question carefully before answering.
- (2) Candidates' revision should cover all the topics within the syllabus.
- (3) Candidates are therefore advised to read and digest every question thoroughly before answering.
- (4) To obtain the true shape, all dimensions are taken from the plan and transferred to the corresponding lines accordingly.
- (5) Scale conversion and drawing of parallel lines need constant practice and candidates are advised to do more work on the force work.

5. **DETAILED COMMENTS**

QUESTION 1

For question 1 the partial plan is first constructed before the elevation is completed. The square is constructed and lines are projected up to locate the distance across corners. The end view of the branch pipe Y is drawn with projectors intersecting those lines from the plan to obtain the line of intersection in the elevation.

Five horizontal lines are extended to the right of the elevation with the height as KK. One side of the square pipe X on plan is measured and used as radius and stepped off five times on the base line to obtain the perimeter. The middle/edge line is then used as the area for the development of the hole for pipe Y.

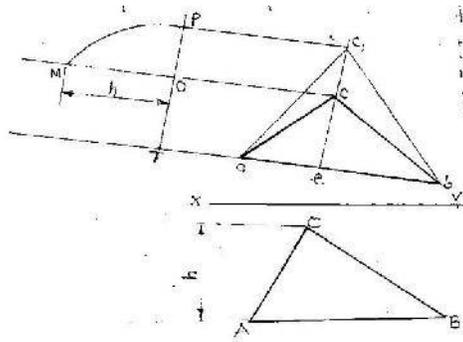
Candidates' performance was good.

QUESTION 2

Before constructing the two given views, line X-Y is drawn as a datum. The elevation and plan are drawn using the given dimensions.

There are two methods for constructing the true shape of the lamina.

- (a) The base length on the elevation is extended to one side. A perpendicular line is drawn to the extended line with another parallel line from the apex to intersect at point O. Point T is taken as centre and TM as radius to draw arc to intersect to point P. A line is drawn from P to intersect line EC extended at C₁. The true lamina is triangle ABC₁.
- (b) The second method is to find the true length of each side of the lamina. Then later use the new true length to construct the true shape of the lamina.



Candidates' performance was average.

QUESTION 3

The elevation is constructed by using the given dimensions with the cutting plane at its correct position. The base circle i.e. the plan is divided into twelve equal parts. Projectors from each divisional points on the circle pass through the base length and to the apex of the cone.

To obtain the cut surface on plan, the intersecting points on the cutting plane are projected to the corresponding dimensional lines. The intersecting points are then joined with a smooth curve to obtain the cut surface. The surface is then hatched.

For the construction of the end elevation, lines are projected from the front elevation and the plan to obtain the outlines of the truncated cone. Lines are projected from the divisional points on the circle on the plan to the base line of the end elevation are drawn parallel to the surface on plan. The intersecting points are then joined with a smooth curve and then hatched.

Candidates' performance was average.

QUESTION 4

(a) Construction of the square and heptagon

The base length AB as 40 is drawn and the square ABCD is constructed on it. A perpendicular bisector is erected on AB and 45° line is drawn to cut the bisector at E. Another 60° line is drawn at B to cut the bisector at F. The distance between points E and F is further bisected to obtain point G. Radius EG or GF is used on the perpendicular bisector at point H. A circle is drawn with point H as centre and AH or BH as a radius through the points A and B. Line AB is used as a radius to locate other five points on the circle. The points are joined to obtain the required heptagon.

Most candidates' construction was neat and accurate. Few candidates did poor work and could not divide, equally, the perpendicular line to locate point H as the centre for drawing the circle.

(b) Auxiliary Plan

The given two views are drawn and parallel lines are drawn from the various corners of the elevation to intersect the X, Y axis at 90° . Various distances between the base line XY on the elevation and the corresponding points on plan are measured and transferred accordingly to the line X, Y to obtain points for the auxiliary view. The various points are then joined with outlines and short dashes to obtain the required auxiliary plan.

Candidates drew the two views but unable to continue the construction. Few candidates constructed the auxiliary plan partially and some of the hidden lines were omitted.

Candidates' performance was good.

QUESTION 5

The force diagram is reversed and parallel lines are drawn to the radial lines. The two ends are closed to obtain the bending moment diagram.

Few candidates did well in all the constructions but unable to measure and convert correctly the magnitudes of the reactions.

Some candidates constructed the shear force diagram which was not part of the question.

Few candidates left the spaces of the forces for labelling the Bow's notation. Some candidates were unable to apply the given scales for their constructions.

Candidates' performance was average.

TECHNICAL DRAWING 3

1. **GENERAL COMMENTS**

The standard of the paper has not changed. The quality and the type of questions has been maintained. The performance of the candidates, as compared with that of the previous years was encouraging.

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

The general performance of candidates was an improvement over the previous years. Candidates, especially those who opted for the mechanical drawing was very encouraging. The draughtsmanship of most candidates was also encouraging and must be duly enhanced for both mechanical and building drawing.

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

- (1) Assembling of components is a problem to candidates who offered the mechanical drawing option.
- (2) Most candidates could not assemble the pulley, washer and the pin at their right positions.
- (3) Candidates who offered building drawing, had difficulty in using the scales.
- (4) The right symbols for door, window, wardrobe and other conventions like concrete, hardcore and earth filling were not drawn at the right positions and were poorly represented.
- (5) Sectioning was also a challenge for candidates who offered the mechanical drawing.
- (6) Most of the candidates were not able to identify the hand tools.
- (7) Freehand sketching of the bracket was poorly done, most candidates decided to use guided instrument and then use freehand through it.

4. **SUGGESTED REMEDIES**

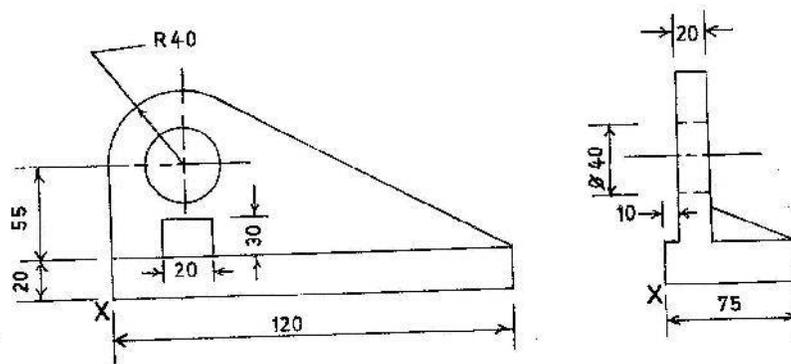
- (1) Teachers are to improve the teaching and also have enough time to treat the application of type of lines which is the core requirement of a good drawing. Most candidates could not show differences in their lines, short dashes was used for centre lines, and cutting plane was poorly drawn in most cases.
- (2) Most candidates seem to have little or no knowledge of the principles of assembling drawing and sectioning, an important component in mechanical drawing. Teachers are encouraged to use models and other forms of teaching aids to teach or deliver this important topic to their students.

- (3) A lot of effort should go into the teaching and practice of freehand sketching. Constant practice with only pencil in freehand sketching would go a long way to improve the skills of candidates.
- (4) Candidates must be introduced to basic tools used in their areas of specialization, i.e Building and Mechanical workshops.

5. **DETAILED COMMENTS**

QUESTION 1

The figure below shows two views of a bracket in first angle orthographic projection. Make a freehand isometric drawing of the bracket making X the lowest point.



Two views of a bracket were shown in first angle orthographic projection, i.e. front elevation and an end elevation.

Candidates were asked to convert the views by using freehand into an isometric block, making 'X' the lowest point. Freehand isometric drawing was required.

Most candidates chose to use guided instruments to draw the bracket, which candidates were penalized for using the instruments, other than pencil only.

The few who drew without guided instrument could not draw it accurately.

QUESTION 2

Make a neat freehand pictorial sketch of a double-sledge hammer.

Candidates were asked to make freehand pictorial sketch of a double faced sledge hammer. It is a heavy duty hammer used in the mechanical workshop.

Only a handful of candidates who attempted this question were able to sketch the correct tool.

Most candidates drew various type of some known types of hammers, which was a total deviation. Identification of the correct tool was a problem.

QUESTION 3

Make a neat freehand pictorial sketch of a centre punch.

This question, like question two, also intended to test candidates' ability to identify common hand tools used in the workshop or on site.

In this instance, the tool to be identified and sketched in pictorial view was the centre punch a common tool used in the metal workshop.

It may be noted that, both tools, this time were all metal work tools.

Most candidates who attempted this question were able to sketch the correct tool, only a few candidates were unable to sketch the tool. Also the candidates were unable to sketch the tool. Also the candidates' sketches were not proportional.

QUESTION 4

A sketch plan of a three bedroom bungalow with accompanying specification from foundation to roof was provided.

Candidates were asked to study the given specifications and draw to a scale of 1:100 a floor plan and a front elevation, and to a scale 1:50 a sectional elevation on plane Y – Y.

Most candidates provided good answers to this question, but the scales used were not the correct scale.

Generally, the draughtsmanship of a few candidates was very encouraging. On the whole, the roof of the building was poorly drawn. Most candidates were not familiar with the concrete roof and were therefore drawing different types of roof.

Teachers are encouraged to teach students the various type of roof used in building construction, also teachers should teach students the correct conventions of building material using the BS 1149 international standards.

Candidates' performance was good.

QUESTION 5

This question demands the knowledge of functional parts in an assembly. The correct positions of the parts are therefore critical in the assembly, it should be arranged in a well-accepted manner.

A very unpopular question, however most candidates who attempted it did well, except that they have problem with the placement of the views, e.g. sectional front elevation and the plan.

Candidates also have difficulty in imaging how the components will appear in the views. There were problems in the sectioning of the parts.

Lines such as centre lines, outline and direction of sectional lines were poorly drawn.

Candidates' performance was generally average.

WOODWORK 2

1. **GENERAL COMMENTS**

The standard of the paper was of good quality and compares favourably with that of the previous year. The performance of the candidates was just average as compared to the previous year.

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

A few of them performed very well in the following areas:

- (1) Naming a suitable joint for joining the sides of the trinket box.
- (2) stating three general safety precautions that should be taken during the use of woodworking machines.
- (3) naming two types of metals used in woodwork.
- (4) preliminary freehand pictorial sketches of the bookcase.
- (5) orthographic drawings of the bookcase in the First Angle Projections.

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

Most of the candidates showed weaknesses in the following areas:

- (1) candidates found it very difficult to make the pictorial sketch of the decorative joint named for the trinket box.
- (2) candidates could not label correctly the parts of the cross-section of the log sketched.
- (3) candidates could not state the reason why a lubricant is used on an oilstone when sharpening a tool.
- (4) inability to provide the required features of the bookcase, i.e one shelf, one panel glazed door, hinges for hanging the door, lock and handle.
- (5) poor dimensioning and lettering.
- (6) failure to name the views.

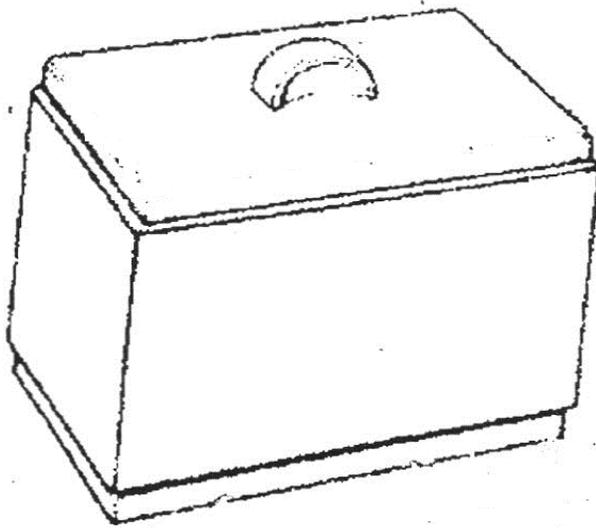
4. **SUGGESTED REMEDIES**

- (1) Tutors should encourage students to practise adequately freehand sketches of wooden joints and their uses.
- (2) Students should be introduced to the types of test carried out when hand planing a stock to finished size.
- (3) Students should be given adequate exercises on design and drawing to equip them and enable them acquire the necessary skills for appreciable level of performance.

5. **DETAILED COMMENTS**

SECTION A - SHORT STRUCTURED QUESTIONS

Figure I shows the sketch of a trinket box which is to be constructed. The top of the box is to be covered with plastic laminate. Use it to answer question 1 (a).



QUESTION 1

- (a) (i) **Name a suitable decorative joint for joining the sides of the box.**
(ii) **Make a pictorial sketch of the joint named in (a)(i).**
- (b) (i) **Name two tests carried out when hand planing a stock to finished size.**
(ii) **List three tools used when preparing a stock to finished size.**
- (a) (i) Majority of the candidates answered this question satisfactorily. The required joints are: Through dovetail; combed/pin/finger/box joint; secret mitred dovetail; plain mitred butt; lap dovetail and double lapped dovetail.
- (ii) Most of the candidates found it very difficult to make a pictorial sketch of the joint named.
- (b) (i) Majority of the candidates were able to name the two tests correctly. The possible tests are: Test for flatness; Test for straightness; Test for squareness, etc.
- (ii) Most of the candidates answered this question satisfactorily

QUESTION 3

- (a) **State three general safety precautions that should be taken during the use of woodworking machines.**
- (b) **List the two operations required for keeping the cutting edge of a tool keen.**
- (c) **State one reason why a lubricant is used on an oilstone when sharpening a tool.**
- (a) Most of the candidates stated general safety precautions instead of those to be taken during the use of woodworking machines. However, a few were able, to state the answers correctly. For example, never get distracted while operating a

machine; never make any adjustment to a machine while it is running; allow machine to reach maximum speed before feeding.

- (b) A few candidates were able to provide correct answers to this question.

The correct answers are:

- grinding;
- sharpening/honing.

- (c) Majority of the candidates failed to state the correct reason. The possible answers are:

- to aid the movement of the tool over the oilstone.
- to reduce friction.
- to float away the particles of steel which are left on the oilstone.
- to reduce the clogging of the oilstone.

QUESTION 4

- (a) (i) **Sketch the cross-section of a log.**
(ii) **Label the following parts of the log sketched in Question 4(a)(i).**
(1) **sapwood;**
(2) **medullary rays.**
- (b) **Name two types of metals used in woodwork.**
- (c) **List two methods of producing veneer.**

- (a) (i) Some candidates used a pair of compasses to draw the cross-section of a log instead of using pencil only to sketch it.
- (ii) Most of the candidates could not label correctly the required two parts of a log, i.e. Medullary rays and sapwood.
- (b) Majority of the candidates were able to name the two types of metal used in woodwork. For example, cast iron; steel; copper; brass and aluminium, etc.
- (c) This question was well answered by most of the candidates.

SECTION B - DESIGN AND DRAWING

The question set is as follows:

A bookcase is to be designed to the following specifications:

Height - 350 mm
Width - 360 mm
Depth - 210 mm

**The bookcase is made from 20 mm solid wood.
It has one shelf and one panel glazed door.**

1. **Make two preliminary freehand pictorial sketches each for a different design of the bookcase.**
2. **Select one of the sketches in Question 1 and indicate the sketch selected with a tick (✓). To a scale of 1:2, draw in the First Angle Orthographic Projection the following views of the sketch selected:**
 - (a) **the front elevation;**
 - (b) **plan with top removed.**

QUESTION 1: PRELIMINARY FREEHAND PICTORIAL SKETCHES

Some of the candidates presented designs that agreed with the given specifications. However, majority of the candidates presented designs with additional features which were not required. There were evidence where candidates produced the preliminary freehand pictorial sketches with the aid of drawing instruments instead of drawing freehand with pencil only. In some cases most candidates failed to indicate with a tick (✓) the selected design.

Tutors should discourage this practice.

QUESTION 2

(a) FRONT ELEVATION

All the candidates attempted this question. Majority of the candidates failed to show the following:

- carcass members: (2 sides, top piece, bottom piece, shelf in hidden details)
- door members: (2 stiles and 2 rails)
- door details: (one glazed panel, one pair of hinges, lock, and a handle)

A few of the drawings presented omitted the three main dimensions and names of the views. However, there were instances where very good drawings were presented by some candidates.

(b) PLAN WITH TOP REMOVED

Most of the candidates failed to draw this view in its appropriate position in the First Angle Orthographic Projection.

In some cases, the sections of the following members were omitted on the drawing:

- carcass members;
- cabinet back covering;
- rail in elevation;
- name of the view.

Tutors should take note and give adequate exercises on this aspect of the drawing.

DRAUGHTSMANSHIP

(i) Border line

Majority of the candidates failed to draw the border lines as required.

(ii) Title block

Majority of the candidates failed to provide the title block.

Candidates are advised to ignore the provision made at the right hand top corner of the drawing sheet and do the right thing as required by the basic principles and conventions.

(iii) Layout

Most of the candidates failed to plan their work properly. Candidates should therefore observe the basic principles and requirements by drawing conventions.

(iv) Neatness

Candidates should observe the following practices for a neat drawing presentations:

- Avoid the use of dirty drawing instruments.
- Use recommended pencil for a specific drawing.
- Arrange views in their respective segments.
- Avoid over-shading of sketches.

WOODWORK 3

1. **GENERAL COMMENTS**

Generally, the standard of the paper was within the scope of the syllabus. The paper was well constructed and satisfactory enough to cater for the level under review.

The performance of candidates as compared with that of previous years was slightly higher.

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

Some commendable strengths observed in the performance of candidates included the following:

- (1) All the candidates attempted the question.
- (2) Most candidates were able to work to the given dimensions.
- (3) Most candidates were able to assemble their final work.

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

Some weaknesses exhibited by candidates included the following:

- (1) inability to read and interpret the working drawing correctly.
- (2) inability to mark-out accurately.
- (3) failure to use well sharpened cutting tools.
- (4) failure of candidates to dress the work.

4. **SUGGESTED REMEDIES**

- (1) Teachers should intensify the teaching of orthographic drawings.
- (2) Candidates should be given adequate practical exercises which involve the reading and interpretation of working drawings.
- (3) Teachers should demonstrate the correct procedure for marking-out practical exercises.
- (4) Candidates should be exposed to the finishing aspects of the practical work, such as assembling, squareness and most especially the dressing of the work to give it the needed appeal.

5. **DETAILED COMMENTS**

QUESTION 1

Candidates were given working drawing of a model of a plinth. They were required to interpret the drawing and construct the model, using already prepared workpieces.

The work involved the following processes:

- (a) **Construction of lapped dovetail joints;**
- (b) **Construction of finger joints;**
- (c) **Construction of through dovetail housing joints;**
- (d) **Finishing.**

(1) Lapped Dovetail Joints

The construction of the lapped dovetail joints was attempted by all the candidates. Quite a good number of candidates were able to mark-out accurately and produced fairly good joints.

However, a few of the candidates lacked the requisite skills to cut and remove waste wood from the tails and sockets of the joints and as a result produced very poor work. Very few candidates were unable to mark-out the dovetails accurately. Some of the candidates marked-out the pitches of the dovetails far out of proportion. A small percentage of the candidates constructed through dovetail joints instead of the lapped dovetail joints shown on the drawing.

(2) Finger Joints

The construction of the finger joints was to form the body of the plinth as well as to add beauty to it. This question was attempted by all the candidates. Most candidates were able to mark-out correctly and constructed good joints. Few candidates however, cut one pin instead of the two pins demanded by the rubrics. Some of the candidates made the joints too loose that they could not be assembled to form the plinth. Some candidates cut the sides of the pins unevenly and were unable to clean the bottoms of the sockets properly. This was the result of the use of blunt cutting tools by the candidates.

(3) Through Dovetail Housing Joints

The construction of the through dovetail housing joints was attempted by about 65% of the candidates. Few candidates only marked-out but did not cut out the joints. Others also constructed the ordinary through housing joints instead of through dovetail housing joints. Notably some candidates found it difficult to cut the sloping sides of the dovetail pins from the corner edge of the workpiece as this required a special skill and the use of very sharp cutting tools.

(4) Finishing:

(i) Assembling

About 68% of the candidates were able to assemble the work, 22% did partial assembling while 10% could not assemble but did well to tie the workpieces together for easy identification.

(ii) Squareness

Few candidates were able to have all four corners of the plinth meeting at 90° which was quite commendable.

(iii) 3 Major Dimensions

Candidates were required to work to obtain the three main dimensions namely the length of plinth, width and height as provided on the working drawings.

About 50% of the candidates were able to work to the given dimensions. A good number of the candidates produced the work slightly bigger than required. In one exceptional case, candidates were provided with workpieces which were about 10 times the given length of the plinth. This did a lot of disservice to the candidates.

(iv) Dressing

Almost all the candidates failed to dress the work. Candidates were expected to clean up all the pencil marks and short of the allowable waste margin using the smoothing plane. This is a perennial problem and teachers should find solution to it.