

# DESIGN AND TECHNOLOGY

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8256  
Paper 1

## GENERAL COMMENTS

This year, 2021 was the first Examination on this syllabus. The syllabus was well developed by the DNEA in collaboration with CIE and was accepted by both institutions. All this was done to upgrade the level of Education in Namibia. Therefore, the two institutions with their teams should be applauded for the exceptional work done to improve the living standards of the Namibian Child.

Thanks, should also go to other role players like the entire Ministry of Education, Regional Offices, Schools, Communities and of course the Candidates who wrote this examination for the first time.

Taking the COVID-19 situation into account, it made it very difficult for the teachers to prepare the candidates well for this examination. It was also difficult for the candidates, but in some way they felt ready for the examination. According to the work assessed, one could see that the candidates tried their best to be successful in this examination with the support of their teachers and their parents.

Very good responses were received from the centres regarding the quality and standard of the question paper. It could be well interpreted regarding the style, language and graphics.

From the responses of the candidates on the questions, there were no problems answering the questions, although in a few cases a follow-up question was misinterpreted. However, good responses were given for certain questions and candidates could score good marks.

Evidence also show that quite a few candidates did not have the knowledge to answer certain questions successfully and some did not attempt certain questions. This situation can only be mastered when more training is given to teachers on how to teach the syllabus successfully. It can illuminate this situation. By the spread of marks for this question paper, it looks acceptable, but there are a lot of areas which needs to improve.

Section A consisted of compulsory short questions across the syllabus. In some cases candidates scored good marks, but in most cases improvement is needed. This can only be done with more training to the teachers.

This year we had 54 candidates of which only one candidate answered the Technology Part, 16 answered the Communication Part and the rest answered the Resistant Part in Section B in the question paper. This section was answered fairly well by most candidates, but better was expected.

It is our expectation that in 2022 there will be a good increase in number of candidates entering to do this subject.

## COMMENTS ON SPECIFIC QUESTIONS

### PART A

- (a) This question was fairly answered by most of the candidates; however, some could not give the desired answer which was **TIDAL** power. Instead they answered hydroelectricity, which was accepted and the mark awarded.

**Desired Response:** Tidal power

- (b) Very good explanations were given by most of the candidates who scored good marks, but quite a few could not give any explanation, because the process was unknown to them.

**Desired Response:** Tidal power, also called tidal energy, is a form of hydropower that converts the energy of tides [1] into useful forms of power, mainly electricity [1].

Movement of water turns the propeller [1] which turns the armature (generator) [1]

- 2 Good answers were given and some candidates scored maximum marks for the procedures to be followed when electrocuted. In some cases, the procedures were not in order, but candidates were not penalised for it.

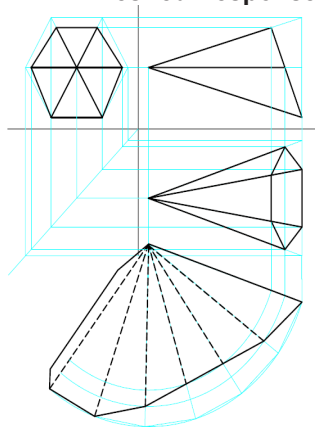
**Desired Response:** ✓ Switch off the electricity if it is still on. [1]  
✓ Begin CPR if the person shows no signs of breathing, coughing or movement. [1]  
✓ Keep the injured person warm by covering the person with a blanket or jacket. [1]  
✓ Cover any burned areas with a sterile gauze bandage or a clean cloth. [1]  
✓ Call the emergency services. [1]

- 3 Most of the candidates scored maximum marks for the term to be explained: **Malleability** and **Ductility**. Some of the candidates could only get one of the terms correct.  
**Desired Response:**  
Malleability:  
A malleable metal is one in which a metal can be deformed under compressive stresses without breaking or fracturing.[1]  
Like taking a billet of red-hot metal and hammering it into the shape of a crankshaft because of its plasticity feature. [1]  
Ductility:  
A ductile metal has the ability to deform under tensile stress.[1]  
Like taking a billet of metal and forcing it through a die to elongate the metal into wire because of its plasticity feature.[1]
- 4 (a) Almost all candidates scored maximum marks for this question. There were only a few that did not know the term anthropometrics.  
**Desired Response:** The science of measuring [1] people [1] is called **anthropometrics**.
- (b) Most candidates could explain how anthropometric data could be used by interpreting the diagram correct and scored maximum marks.  
**Desired Response:** The measurements from the foot to the seat. [1] can be used to determine the height of the seat.[1]
- 5 Only a few candidates scored maximum marks, the rest could score only one mark, because they could not identify the **Control** in the system.  
**Desired Response:** Control: Amplifier [1] Output: Speaker [1]
- 6 Most of the candidates scored good marks for this question, while others could only score less than the half of the marks awarded for the design process.  
**Desired Response:**
- ✓ Identified a design need and produced a design brief.
  - ✓ Drawn up a detailed list of specifications.
  - ✓ Performed market research/product analysis and produced data accordingly.
  - ✓ Generated various possible solutions to your design problem, made a final selection and are able to explain why.
  - ✓ Produced detailed rough and free hand sketches and at least one working drawing.
  - ✓ Identified design constraints.
  - ✓ Chosen a specific material and are able to explain why, as well as produce a detailed cutting list.
  - ✓ Drawn up a detailed manufacturing plan.
  - ✓ Tested various processing methods and decided on the best and most practical option in each case. You are also able to describe and explain your choices.
  - ✓ Produced a detailed list of tools and machines required and know how to safely and correctly work with each one.

## PART B DESIGN COMMUNICATION

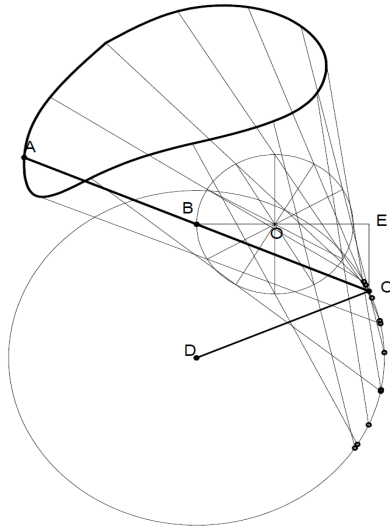
Two centres out of 11 answered this part of the question paper, giving you a total of 10 candidates

- 7 (a) Some candidates scored good marks for the orthographic projection, but quite a few of them could not get the development of the truncation correct. The candidates could not apply the necessary knowledge and skills regarding the development.  
**Desired Response:**



- (b) Only one centre could answer this question correctly from which most of the candidates scored maximum marks. From the other centre only a few could score marks here, because they evidently did not have the knowledge to answer it. Loci is an important part of the syllabus and it was expected that all candidates should score good marks.

**Desired Response:**



- (c) The concepts market-pull and producer-led design was answered fairly well by most of the candidates, but did not give enough information to score maximum marks. Most of their answers given fell in the **medium band** and some in the low **higher band**.

**Desired Response:**

**Market pull design** is when a need is in the community.

- ✓ A company sees the need and designs something to fill the need.
- ✓ School shoes is an example of market-pull design, because schools prescribe which shoes are to be worn.
- ✓ Medicine, vaccines and food are also examples market-pull, because medicine is produced to make people well.
- ✓ People buy market pull articles because they need them.
- ✓ With producer-led design, there is no real need.
- ✓ Producer-led design is where the designer has an idea to improve lives and then designs something that a person does not need, but advertises and starts a trend that makes people want to buy the product.
- ✓ People tend to buy producer-led articles because of peer pressure or for luxury.
- ✓ Examples of producer-led designs are modern cell phones, branded clothing, trendy accessories and fast foods.
- ✓ When a client smells the fast food, he / she becomes hungry.
- ✓

**RESISTANT MATERIALS**

Most of the centres chose to answer this question.

- 8 (a) (i) Most candidates answered this question satisfactorily and scored maximum marks. A few lost a mark for not marking and punching the centre where to drill.

- ✓ Clear sketch/es of an appropriate process [1]
- ✓ Measuring and marking out centre of hole **or** work piece secured/fastened (some notes should be presented) [1]
- ✓ Method of drilling hole [1]

- (ii) Good marks were scored here, but evidently, some candidates did not know what a woodwork lathe is.

**Desired Response:**

- ✓ Clear sketch/es of a lathe [1]
- ✓ Prepare block of wood or mount between centres [1]
- ✓ Adjust tool rest correctly or select suitable tool [1]

- (iii) Almost all candidates scored good marks, only a few of them gave safety rules instead of maintenance.

- ✓ Clean or blow off chips and dust regularly from lathe [1]
- ✓ Inspect lathe regularly for loose bolts & nuts and tighten if needed, as well as drive belts for cracks

- ✓ and electrical cable [1]
  - ✓ Oil metal and moving parts [1]
- (b) (i) Answered fairly well by most of the candidates and the justification acceptable and they scored good marks here.
- Desired Response:**
- Suitable metal:**
- ✓ Aluminium
  - ✓ Duralumin
  - ✓ Mild steel
  - ✓ Stainless steel [1]
- Justification:**
- ✓ Lightweight [1] easy to carry [1]
  - ✓ Easy to cut/drill/join [1] product easily made [1]
  - ✓ Polishes well [1] aesthetically pleasing [1]
  - ✓ Cheap to buy [1] product will not be expensive
- NB! Justification must relate to the specific property/ies of the named metal
- (ii) Good answers were given by candidates and scored good marks. In most cases a mark was lost because the explanatory notes were not there.
- ✓ Method - bending, fabrication (joining), casting or making a cut out [1]
  - ✓ Description with sketches and notes [2]
- (iii) Only a few candidates could score maximum marks here using hinging and linkages. The rest mis-interpreted the question and bend the material, however one mark was given for their graphics.
- Desired Response:**
- ✓ Method - suitable hinge (butt, piano, material...) [1]
  - ✓ Description with sketches and notes [2]
- (c) (i) Some candidates scored maximum marks, some scored one mark only and quite a few scored nothing, because the process was unknown to them.
- ✓ Fig. 10: - Hand lay-up (hand laminating) [1]
  - ✓ Fig. 11: - Spray lay-up (spray laminating) [1]
- (ii) Quite a number of candidates scored good marks describing the moulding process, but in some cases, they got the example wrong.
- Desired Response:**
- ✓ Description of how GRP moulding is done [0-3]
- Examples of products like:**
- ✓ boats, storage tanks, tubs and showers, aircraft components [1]
- (iii) Pigments: Good answers were given by most of the candidates and scored maximum marks.
- Desired Response:**
- Explanation must include: Pigments or colourants to add colour [1] to plastics/products [1]
- Fillers: Only a few candidates could give the correct answer. The rest miss-interpret fillers and got confused by filling holes in materials.
- Desired Response:**
- Explanation must include: Fillers are non-plastic materials that are added to plastic [1] to reduce the amount of plastic used in order to reduce costs or to improve certain properties like electrical conductivity. [1]
- (d) The discussion of smart and modern materials was surprisingly answered very well by most of the candidates. Only a few candidates could not successfully describe modern materials.
- Smart material**
- ✓ Responds to a stimulus like heat or light, and then returns to its original state when the stimulus is removed.
  - ✓ Name of suitable smart materials e.g. thermochromics, photochromic,
  - ✓ Applications e.g. kettles, coffee mugs, self-darkening glasses and welding helmets,
- Modern material**
- ✓ Has been engineered to have improved properties but the material doesn't 'change' in response to stimulus.
  - ✓ Name of suitable modern materials e.g. Kevlar, carbon fibre, bendy ply, polymorph.
  - ✓ Applications e.g. bulletproof vest, strengthening tyres, skateboard, fishing rod, tennis rackets

## TECHNOLOGY

Only one candidate answered this question. The centre from which this candidate came from, specialised in **Resistant Materials**

- 9 (a) This question was not answered as expected. The candidate had an idea in the interpretation of the question, but did not have the knowledge to answer the question satisfactorily, therefore could only score a minimum mark.

**Desired Response:**

- ✓ Speed ease, effectiveness at which things are done.
- ✓ Increases access to information
- ✓ Reduces costs and time
- ✓ Technological development brings economic growth.
- ✓ It also enhances social wealth by increasing the income levels and wealth.
- ✓ Technological development makes very important contributions to the economic and social-cultural life.

- (b) (i) No marks were scored here, because the candidate had no knowledge of how to do the calculation.

**Desired Response:**

$$\begin{aligned}\text{Forces around X} &= F \times d \\ &= (680 \times 1.4) + (420 \times 4.4) [1] \\ &= 2800\text{Nm} [1]\end{aligned}$$

- (ii) No marks were scored here, because the candidate had no knowledge of how the calculation should be done.

**Desired Response:**

$$\begin{aligned}\text{Forces around Y} &= F \times d \\ &= (680 \times 4.6) + (420 \times 1.6) [1] \\ &= 3800\text{Nm} [1]\end{aligned}$$

- (c) The candidate did not attempt this question and could not score any marks.

**Desired Response:**

Angle grinders [1]  
Differentials of vehicles [1]  
Hand drills [1]  
Steel rollup doors [1]  
Sluice gate [1]

- (d) (i) The candidate managed to score maximum marks, because the formula was applied correctly.

$$\begin{aligned}\text{Velocity ratio} &= \text{teeth of driven gear/teeth of driver gear} \\ &= 60/20 [1] \\ &= 3:1 [1]\end{aligned}$$

- (ii) The candidate could not score any marks here, because he did not have the knowledge to do the calculation.

**Desired Response:**

$$\begin{aligned}\text{rpm of output shaft} &= \text{driver shaft} \times \text{teeth of driver gear/ teeth of driven gear} \\ &= 20 \times 540/60 [1] \\ &= 180 \text{rpm} [1]\end{aligned}$$

- (e) This question was not attempted by the candidate, thus could score no marks.

**Desired Response:**

- ✓ The positive part of the sinusoidal wave of the AC will flow through point A in the bridge through D2 to point B in the bridge through the load to point D in the bridge through D3 to point C in the bridge back to the AC power supply eliminating the negative part of the sinusoidal wave.
- ✓ The negative part of the sinusoidal wave of the AC will flow through point C in the bridge through D4 to point B in the bridge through the load to point D in the bridge through D1 to point A in the bridge back to the AC power supply eliminating the positive part of the sinusoidal wave.
- ✓

- (f) (i) Here the candidate scored maximum marks. One could see the knowledge of how to calculate resistance was there.

**Desired Response:**

$$\begin{aligned} I_L &= V_s/R_L \\ &= 250/100 \quad [1] \\ &= 2.5 \text{ A} \quad [1] \end{aligned}$$

$$\begin{aligned} I_R &= V_s/R_R \\ &= 250/10 \quad [1] \\ &= 25 \text{ A} \quad [1] \end{aligned}$$

$$\begin{aligned} I_C &= V_s/R_C \\ &= 250/25 \quad [1] \\ &= 10 \text{ A} \quad [1] \end{aligned}$$

- (ii) The candidate did not score any marks, because he did not know how to do the calculation.

**Desired Response:**

$$\begin{aligned} \checkmark \quad I_T &= \sqrt{I_R^2 + (I_C - I_L)^2} \\ &= \sqrt{10^2 + (25 - 2.5)^2} \quad [1] \\ &= 24.622 \text{ A} \quad [1] \end{aligned}$$

- (iii) No attempt was made by the candidate to answer the question.

**Desired Response:**

$$\begin{aligned} Z &= V_S / I_T \\ &= 250/24.62 \quad [1] \\ &= 10.154 \text{ ohm} \quad [1] \end{aligned}$$

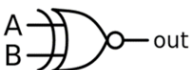
- (g) The candidate did not attempt this question.

**Desired Response:**

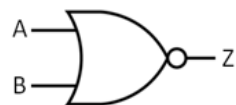
(i)



(ii)



(iii)



## CONCLUSION

This was a good marking session and a great learning process. The work is not on standard as expected, but with the necessary training it can improve.