



ASSESSMENT AND EXAMINATIONS DIRECTORATE

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NSC 2016 CHIEF MARKER'S REPORT
FOR MEMO DISCUSSION
IN PRETORIA 28 – 11 - 2016

SUBJECT	MECHANICAL TECHNOLOGY
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PAPER	1
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DATE OF EXAMINATION:	21 NOVEMBER 2016	DURATION:	3 HOURS
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.This analysis has reference at providing feedback to the Department of Education in the Eastern Cape with regard to the November 2016 Mechanical Technology question paper that was written on Monday 21 November 2016.

The report is based on the following:

SECTION 1. ALTERNATIVE RESPONSES TO MEMORANDUM.

SECTION 2. COMMENTS ON QUESTION PAPER.

SECTION 3. DISTRIBUTION OF COGNITIVE LEVELS.

SECTION 4. LEVEL OF DIFFICULTY.

SECTION 5. UNFAIR QUESTIONS.

SECTION 6. AMENDMENTS AND ADDITIONS

SECTION 8. TIME ALLOCATION

Section 1: ALTERNATIVE RESPONSES TO MARKING MEMORANDUM.

Question 2

2.1 Surface grinder:

- Wear protective clothing as well as eye protection.
- Make sure all guards and safety devices are in place and working correctly.

2.2 Arc welding:

- Always wear protective clothing and equipment.

2.3 Bearing puller:

- Make sure the puller is the right one for the job.
- Make sure it is strong enough to remove the bearing or gear.
- Make sure to tighten the clamps properly.
- Do not hammer on the puller.

2.5 Rockwell tester:

- Cover the area where the metal ball will be launched onto the material to be tested.

QUESTION 3

3.2 Gas analyser:

- To determine the amount of carbon dioxide being processed by the engine.

3.3 Advantages of MIG/MAGS welding:

- It is an automatic or semi – automatic process of welding.

3.5.1 Compression tester:

Why we remove the high tension leads:

- No voltage will be delivered through the HT leads, because it can damage.
- To avoid possible sparking at the plug caps.

QUESTION 4

4.3 Tempering hardened steel:

- To produce definite physical properties within the steel.

QUESTION 6

6.1.1 Undercutting:

- Arc voltage to low.
- Excessive heat.

6.1.2 Lack of fusion:

- No fusion between the weld metal and the surface of the base metal.
- Weld puddle is too large.
- Weld metal has been permitted to roll in front of the arc.
- The use of a very wide weld joint.

- Low welding voltage.

6.7 MIG/MAGS shielding gas:

- Tirrell(Ash 5) also much cheaper than CO_2

QUESTION 8

8.3.1 Pour point:

- The liquid still behaves like a fluid.

8.5 Cutting fluid:

- Better finish is being imparted on the work piece.
- Productivity is increased because the cutting process is faster.

QUESTION 10

10.2 Supercharger:

- Increase performance.

10.3 Advantages of supercharges:

- It is cheaper to install.
- It is easier to maintain and service.
- No special shutdown period is required.

SECTION 2: AMENTMENTS AND ADDITIONS

SECTION 3: COMMENTS ON QUESTION PAPER.

A. Standard of question paper.

The standard of the question paper was fair with the exception of question 5.1 which is not CAPS compliant.

The mark allocation for the different contents is according to the policy document.

- Multiple – choice questions (20)
- Safety (10)
- Tools and equipment. (12)
- Materials (13)
- Terminology (30)



- Joining methods (25)
- Forces (30)
- Maintenance (15)
- Systems and control (25)
- Turbines (20)

TOTAL MARK: [200]

SECTION 3 DISTRIBUTION OF COGNITIVE LEVELS.

MECHANICAL TECHNOLOGY			CHALLENGE		
QUESTION	MARKS PER QUESTION	TOPIC	EASY	MEDIUM	DIFFICULT
		Multiple-Choice			
1,1	1	Safety	1		
1,2	1	Safety	1		
1,3	1	TOOLS & EQUIPMENT	1		
1,4	1	TOOLS & EQUIPMENT		1	
1,5	1	MATERIALS	1		
1,6	1	MATERIALS	1		
1,7	1	TERMINOLOGY	1		
1,8	1	TERMINOLOGY	1		
1,9	1	TERMINOLOGY	1		
1,10	1	JOINING METHODS		1	
1,11	1	JOINING METHODS		1	
1,12	1	FORCES		1	
1,13	1	FORCES		1	
1,14	1	MAINTENANCE		1	
1,15	1	MAINTENANCE		1	
1,16	1	SYSTEMS & CONTROL	1		
1,17	1	SYSTEMS & CONTROL			1
1,18	1	SYSTEMS & CONTROL			1
1,19	1	Turbo charger		1	
1,20	1	TURBINES		1	
	20		9	9	2
		SAFETY			

2.1	2	Surface grinder
2.2	2	PPE Arc welding
2.3	2	Bearing puller
2.4	1	Bench grinder
2.5	3	Rockwell Hardness tester
	10	
		TOOLS & EQUIPMENT
3.1	2	Bending test
3.2	2	High CO reading
3.3	2	Advantage of MIG/MAGS
3.4	2	Multi meter
3.5	1	Compression test
3.5.1	1	Remove high tension lead
3.5.2	1	Unplug fuel injection system
3.5.3	1	Open throttle valve
3.5.4	1	Record the readings
	12	
		MATERIALS
4.1	2	Properties of cementite
4.2	2	purpose of case hardening
4.3	2	Purpose of tempering
4.4.1	1	Carbon content diagram
4.4.2	1	Temperature
4.4.3.	1	AC 1
4.4.4	1	AC 3
4.4.5	1	Austenite
4.4.6	1	Ferrite
4.4.7	1	Perlite
	13	
		TERMINOLOGY
5.1.1	2	Module
5.1.2	2	Outside diameter
5.1.3	2	PCD
5.1.4	2	Dedendum
5.1.5	3	Centre distance
5.1.6	3	Indexing
5.2.1	2	Width of key
5.2.2	2	Length of key
5.2.3	2	Thickness of key big end
5.2.4	4	Thickness of key small end
5.3.1	2	Index plate
5.3.2	2	Sector arm
5.4	2	Methods for V- screw thread

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	30	
		JOINING METHODS
6.1.1	2	Undercutting
6.1.2	2	Lack of fusion
6.2	6	Ultrasonic test
6.3	1	Advantage of ultrasonic test
6.4	2	X-Ray test
6.5	2	Dye penetrant test
6.6	2	Destructive tests
6.7	2	Gasses for MIG/MAGS
6.8	6	Labels of Mig welding
	25	
		FORCES
7.1	13	System of forces
7.2.1	5	Diameter of bar
7.2.2	3	Strain
7.2.3	3	Change in length
7.3	6	Calculation beab
	30	
		MAINTENANCE
8.1	3	Effects of lack of maintenance
8.2	2	Subgroups of preventitive ma.
8.3.1	2	Pour point
8.3.2	2	Flash point
8.4	2	Belts to be replaced
8.5	2	Cutting fluid
8.6	2	Chain drives
	15	
		SYSTEMS & CONTROL
9.1.1	4	Rotational frquency pulley
9.1.2	4	Power transmitted
9.2.1	3	Rotational frequency gears
9.2.2	2	Velocity ratio
9.3.1	4	Fluid pressure
9.3.2	4	Load calculation
9.4	2	Traction control
9.5	2	Airbags
	25	
		TURBINES

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5	10		0
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			4
			3
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			4
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		2	
0	4		21

10.1	2	Types of blowers
10.2	2	Function of super charger
10.3	2	Advantage of supercharger
10.4	1	Turbocharger drive
10.5	2	Run away speed - turbine
10.6.1	2	Francis turbine
10.6.2	2	Pelton turbine
10.6.3	2	Kaplan turbine
10.7	5	Label of Jet engine
	20	

2		
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5		
7	13	0
49	98	53
30%	50%	20%
60	100	40

My finding is that the distribution of the cognitive levels is disadvantaging the learners with regard to the policy document in terms of the lower order and higher order question distributions.

SECTION 4. LEVEL OF DIFFICULTY.

By all means I agree with the standard of the question paper, but it was most challenging for the underperformed learners.

SECTION 5. UNFAIR QUESTIONS

QUESTION 5.1

This question is not CAPS compliant.

The CAPS DOCUMENT clearly state on page 27 under bullet:

Milling Machine. Calculations on:

- Cutting of a gear using only simple indexing.

This question is 11 marks and is being regarded as an unfair question.

QUESTION 10

10.6. Water turbines:



The question is being asked for 2 marks and you have to identify the turbine from a sketch / drawing and also state the operational principle.

The explanation of the operational principle in itself is worth much more than 2 marks.

The memo also do not give us a clear answer as to the correct identification of the 3 turbines, which is the Francis, Pelton and Kaplan turbines respectively.

SECTION 6. AMENDMENTS AND ADDITIONS

Amendments and additions has been covered under sections 1, 2, 4 and 5.

MR. SHANE PHILLIPS

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28 – 11 - 2016

NAME OF THE CHIEF MARKER:

SIGNATURE

DATE