REGISTRATION CENTRE NUMBER	CENTRE NAME	
CANDIDATE'S FULL NAMES		
CANDIDATE IDENTIFICATION NUMBER	SUBJECT CODE **7170**	PAPER NUMBER **3**
[redacted]		
FOR OFFICIAL USE ONLY		

FOLD ◄

CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD
ADVANCED LEVEL EXAMINATION

SUBJECT TITLE	SUBJECT CODE	PAPER NUMBER
ELECTRICAL AND ELECTRONIC SYSTEMS	**7170**	**3**
	EXAMINATION DATE: **JUNE XXXX**	

Duration 4 Hours

INSTRUCTIONS TO CANDIDATES

This paper is comprised of **THREE** parts which are:

PART I-FAULT TRACING

PART II- REPAIRS AND MEASUREMENT

PART III-ANALYSIS

You are advised to read carefully through the question paper, before you begin your answers.

You are reminded of the necessity for good English and orderly presentation in your answers.

FOR EXAMINERS' USE ONLY	
Marked by……..... Signature of Examiner: ……..Date:……	***SCORE***
Checked by…… Signature:…… Date:……	

ELECTRICAL/ELECTRONIC SYSTEMS
7170

CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD
General Certificate of Education Examination

JUNE XXXX **ADVANCED LEVEL**

PART I
FAULT TRACING

Time**: One Hour**

INSTRUCTIONS TO SUPERVISORS ONLY

Candidates shall choose by ballot one fault from the list of **TWO** main engine systems, the fuel supply system

- Examiners shall simulate one fault on each of these systems.
- They should however ensure that the engine is in good working order before the simulation is carried out.
- Candidates should be reassured of the good working order of the engines on which they will perform the fault tracing.
- Examiners should closely watch the candidates during their work so that the method used is noted accordingly.
- Examiners should closely watch the candidates and **INTERVENE IF NEED BE** during the fault tracing. This is to avoid damages that may be caused by the candidate.
- In case of any disorder in their work that might lead to damage or injury, the examiners should immediately stop the candidates.
- All fault tracing forms must be corrected or marked in front of the candidates so that coherence in the method and onward skills can be objectively evaluated.
- Examiners shall ask questions in relation to the each candidate's work without necessarily intimidating or frustrating the candidate.
- The list of proposed faults to be simulated is found below:
  - This part is made up of three main sections (A), (B) and (C), each section is comprised of four topics.
  - By ballot, the candidate is expected to choose a topic either under section A, B, or C.
  - The examiner(s) shall provide the candidate with ALL the necessary working materials.
  - All the candidates are expected to answer the written questions at once before proceeding to the practical phase.
  - The written exercise must not EXCEED 15minutes
- Make sure that you hand in the answered questions back to the examiners.

SECTION A: Electrical Supply/Starting (15 mins)

1- Remove the starter fuse
2- Feed a bad starter motor
3- Disconnect the starter motor switch
4- Remove the starter relay

SECTION B: Lighting and signalization system (15 mins)

1- insulate the battery terminals
2- remove the headlamp fuse
3- feed a bad flasher unit
4- Remove the horn relay

SECTION C: Charging Circuit (15 mins)

1- Remove the fan belt
2- Remove the brushes
3- Disconnect the warning light live cable
4- Disconnect the alternator positive cable

N.B: The candidate is expected to trace all the faults and put back the circuit in a functional state.
This section MUST ONLY be handled by the examiners.

REPUBLIC OF CAMEROON
Peace-Work-Fatherland

MINESEC/GCE BOARD

"ADVANCED LEVEL"
Series: AUTOMOBILE REPAIRS MECHANICS
Session:
Time: 15 minutes

Practical paper

FAULT TRACING

NAME OF CANDIDATE---------------------------------
CODE NUMBER--------------------------
DATE--

✂ -·-

CODE NUMBER--------------------------
ATC ADVANCED LEVEL
DATE--

WRITTEN QUESTIONS (5marks)

1- Briefly explain how trailers are wired to avoid voltage drops?

2- What is the difference between a diode and a transistor?

3- What is the purpose of a jumper cable?

4- Why do heavy duty vehicles use higher capacity batteries?

5- Explain the advantage of using double starter motors in heavy duty engines

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JUNE XXXX **ADVANCED LEVEL**

PART I
FAULT TRACING

Time**: One Hour**

WORK REQUIRED.

The candidates are expected to:

1. Use appropriate tools and correct methodologies to trace the faults simulated, then start and proceed to engine tuning.
2. Carry out a complete engine tune-up using the appropriate equipment supplied by the examiners.
3. Answer the question that shall be posed by the examiners.
4. Fill the fault tracing form.

PART 1: FAULT TRACING				
S/N	**Item**	**Maxi. mark**	**Score**	**Remarks**
1	Out fit	02		
2	Procedure	04		
3	Faults traced	06		
4	Proper use of instruments	06		
5	Corrective action taken	06		
6	Answers to questions	06		
7	Respect of time	04		
8	Filling of form	04		
PART 1 TOTAL		**40**		

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PART II-REPAIRS AND MEASUREMENT Time: Two Hours
WORK REQUIRED.

A-For repairs

- Dismount
- Dismantle
- Inspect and determine faults
- Repair component
- Remount
- Adjust
- Test
- Establish a report (see table 1)
- Answer the questions from the examiners.

B-For measurements

- Check;
- Take measurements
- Compare values obtained with the manufacturer's specifications
- Establish a form (see table 2)
- Answer the questions from the examiners.

PART II: REPAIRS AND MEASUREMENTS				
REPAIRS				
1	Dismounting	02		
2	Dismantling	01		
3	Faults identified	02		
4	Choice and mastery of tools	02		
5	Pertinence of checks and adjustments carried out	03		
6	Results obtained	06		
7	Remounting	04		
8	Respect of time given	04		
9	Testing	06		
10	Answers to questions	05		
11	Filling of the repair form	05		
SECTION A TOTAL		**40**		
MEASUREMENTS				
1	Preparation of the work post	02		
2	Use of apparatus	02		
3	Pertinence of the measurement	02		
4	Result obtained	03		
5	Respect of time given	02		
6	Testing	02		
7	Answers to questions	03		
8	Filling of measurement form	04		
SECTION B TOTAL:		**20**		

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JUNE XXXX **ADVANCED LEVEL**

PART II-REPAIRS AND MEASUREMENTS

Time**: Two Hours**

INSTRUCTIONS TO SUPERVISORS

The candidates shall choose by ballot in the presence of the examiners, one of the components on the list ‘‘**A**’’ and “**B**”. Each number chosen by ballot corresponds simultaneously to the number on list the “**A**” for repairs and on the list “**B**” for measurement.
An example: If a candidate chooses figure 1 in the ballot, it automatically corresponds to:

- A, the electric horn for ‘‘Repairs ”
- B, starter motor ‘‘Measurements’’

❖ At the end of the first work post, that is repairs, the candidate shall answer **THREE** questions from the examiners, chosen among the set of questions given below.

❖ For the second part, that is measurements, the examiners shall ask **THREE** questions of their choice, in relation to the component chosen on the work post.

The marking of tables 1 and 2 shall be done in front of the candidate’s work post in order to verify the exactness of the latter’s work.

Table of list A and B

Nº	**List A**	**List B**
1	Battery	Flasher unit
2	alternator	Starter motor
3	Glow plugs	5 pin Relay
4	Signaling Circuit	Stop lamp
5	Dashboard meters/gauges	Alternator

Proposed questions (these must not be kept within the reach of the candidates)

1. Outline the method of work on this component and precise the necessary tools to be used.
2. State two regular faults that likely occur on this component.
3. State the origin of each fault.
4. Explain how you would remedy the faults when noticed.
5. What advice will you give to the user to prevent and or increase the working life span of the component?

FAULT TRACING FORM

NAME OF CIRCUIT OR COMPONENT	CHECKS	INSTRUMENT(S) USED	VALUES		POSSIBLE FAULTS	REMEDIES
			GIVEN	FOUND		

EXAMINER(S) OBSERVATION **EXAMINER'S NAME AND SIGNATURE:**

TABLE 1: REPAIRS

Nº phase	Phase	Nº operation	Operation	Duration	Duration of operation	Technical information (and diagram)	Tools	Conclusion

TABLE 2: MEASUREMENTS

NAME OF ORGAN	CHECKS	MEANS USED	VALUES		APPRECIATION		CONCLUSION
			GIVEN	FOUND	GOOD	BAD	

CONCLUSION _____

_____

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Written Questions Repairs and measurement

Answer all questions in the spaces provided

1. Why do starter motors of heavy duty vehicles fitted with gear reductions?

……
……
……
……

2. What is the use of the number plate light?

……
……
……
……

3. Why is the alternator's current rectified?

……
……
……
……

4. What measure is taken to minimize voltage drops in a trailer circuit?

……
……
……
……

5. Give three (3) areas of concern that can lead to fire in an electrical circuit

……
……
……
……

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PART III-ANALYSIS Time**: One Hour**

a) State four (4) possible causes and their remedies for a noisy starter **(6mks)**

Complaint	**Possible causes** *(1mk×4 = 4mks)*	**Remedies** *(0.5mk×4 =2mks)*
noisy starter motor		

b) After carrying the diagnosis on the Starting system, it was noticed that the starter pinion is loose. In the table below, explain the procedures in removing the starter motor from the engine and state systematically three bench test carried out on the starter motor and the basic tools used
(8mks)

N⁰	**Operation**	**Tool**

c) After carrying the diagnosis on the starting system, the following parts were replaced.

- Starter pinion
- The starter ring gear
- Starter Fuse
- Starter solenoid

The complete repair process took you from 4h15min to overhaul the engine with a break of 45minutes.

EXTRACT OF SPARE PARTS CATALOGUE

N°	Designation	number	Unit price	Total price
1	Set of radiator hose	1	9000	9000
2	starter solenoid	1	4000	4000
3	Fuel filter	1	2000	2000
4	Piston rings	1	5000	5000
5	Pipe gaskets	1	5000	5000
6	Starter fuse	1	500	500
7	Glow plugs	1	5000	5000
8	Charging system Fuse	1	3000	3000
9	pressure pipes	1	4000	4000
10	Thermostat	1	7000	7000
11	Starter ring gear	1	8500	8500
12	Injector nozzles	1	15000	15000
13	Pipe gaskets	1	1000	1000
14	Starter pinion	1	4500	4500
15	Air filter Element	1	5000	5000
16	Kinked brake lines	1	27000	27000
17	Brake pads	1	7500	7500

1) Calculate the labour cost, if the hourly rate is 3500 FRS
2) Calculate the cost of the spare parts, knowing that V.A.T is 19.25% on the total cost of spare parts.
3) Prepare a bill to your customer giving him a discount of 5%

GARAGE
BP:_____
Tel:_____

ESTIMATE N°_____
Date___ /_____/_____

CUSTOMER	VEHICLE
ADRESS:……...	MARK:……. TYPE……..
……	YEAR OF MANU: ……...
TEL: ……..	SERIAL N°:……...
FAX: ……	REGISTRATION:…….

1-LABOUR COST **(2mks)**

N°	Designation of phases	Time	Unit price	Total price
1				
2				
3				
4				
5				
	TOTAL			

2-COST OF SPARE PARTS **(2mks)**

references	Designation of spare parts	Quantity	U.P	T.P	Total price
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
	TOTAL				

3- TOTAL COST OF REPAIR ESTIMATE **(4mks)**

AMOUNT WITHOUT TAXES	AMOUNT OF V.A.T	TOTAL
Net to be paid (amount in words): ……...…… ……..		

CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD

JUNE XXXX **ADVANCED LEVEL**

EVALUATION SHEET

Centre No: …….. **Centre Name**: ……
Candidate's Name: ……
Candidate's Number: …… **Code Nº**: ……

PART 1: FAULT TRACING				
S/N	**Item**	**Maxi. mark**	**Score**	**Remarks**
1	Out fit	02		
2	Procedure	04		
3	Faults traced	06		
4	Proper use of instruments	06		
5	Corrective action taken	08		
6	Answers to questions	06		
7	Respect of time	04		
8	Filling of form	04		
PART 1 TOTAL		**40**		
PART II: REPAIRS AND MEASUREMENTS				
REPAIRS				
1	Dismounting	02		
2	Dismantling	01		
3	Faults identified	02		
4	Choice and mastery of tools	02		
5	Pertinence of checks and adjustments carried out	03		
6	Results obtained	06		
7	Remounting	04		
8	Respect of time given	04		
9	Testing	06		
10	Answers to questions	05		
11	Filling of the repair form	05		
PART II TOTAL		**40**		
MEASUREMENTS				
1	Preparation of the work post	02		
2	Use of apparatus	02		
3	Pertinence of the measurement	02		
4	Result obtained	03		
5	Respect of time given	02		
6	Testing	02		
7	Answers to questions	03		
8	Filling of measurement form	04		
PART II TOTAL:		**20**		
GRAND TOTAL		**100**		

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JUNE XXXX **ADVANCED LEVEL**

PAPER 3 - PRACTICALS

ADVANCED INFORMATION TO CENTRES

PART I: FAULT TRACING

MATERIAL ESTIMATE PER CANDIDATE FOR FAULT TRACING

S/N	DESIGNATION	QTY	U.P	Amount
1	Electric Cable	2m	500	1000
2	5 pin Relays	2	1500	3000
3	Bulbs	5	200	1000
4	Variety of fuses	5	200	1000
GRAND TOTAL				**6000**

PART II: REPAIRS AND MEASUREMENTS

List of material needed for repairs:

- 2 Batteries
- Alternators
- Glow plugs
- Signaling Circuits
- Dashboard meters/gauges
- A heavy duty truck with complete electrical circuits

List of material needed for Measurement:

- Flasher units
- Starter motors
- 5 pin Relays
- Stop lamps
- Alternators
- Millimeter
- Test lamp
- Vernier Caliper