ADVANCED LEVEL NATIONAL EXAMINATIONS, 2015,
TECHNICAL AND PROFESSIONAL TRADES

EXAM TITLE: Mechanical Technology

OPTION: General Mechanics (GME)

DURATION: 3 hours

INSTRUCTIONS:

The paper is composed of **three (3) Sections:**

Section **I:** Fourteen (14) questions, all **Compulsory.** 55 marks

Section **II:** Five (5) questions, **Choose Three (3) only.** 30 marks

Section **III:** Three (3) questions, **Choose only one (1).** 15 marks

**Every candidate is required to strictly obey the above instructions. Punishment measures will be applied to anyone who ignores these instructions.**
Section I. Fourteen (14) Compulsory questions. 55 marks

01. State two commonly used methods of filing and when they are applied. 4 marks

02. Name the parts of the hacksaw as labeled in the figure. 6 marks

[Diagram of a hacksaw with labeled parts 1, 2, 3, 4, 5, 6]

03. Why is saw setting essential for a hacksaw blade? 1 mark

04. Give the types of setting of blade teeth. 3 marks

05. Name the punches shown below and give clearly the applications of each. 6 marks

[Diagram of three different punches]

06. Name the different parts of fitter parallel vice as labeled. 4 marks

[Diagram of a fitter parallel vice with labeled parts 1, 2, 3, 4, 5, 6, 7, 8]

07. A 400g hammer is moving at a speed of 3m/s. It strikes a bush and pushes it by a distance of 5mm. Calculate the force of the hammer blow on the bush. 2 marks

08. Define a "scraper" and give different types of scrapers commonly used. 5 marks
09. What shall be the r.p.m and time required of a 35 mm diameter drill when drilling on mild steel plate 25 mm thick, the recommended cutting speed is 25 m/min at feed of 0.36 mm/min.  

10. Read the dimensions on Vernier micrometer.  

11. Read the dimension and name the parts as labeled.  

12. Define the mechanical properties of metals:  
   A. Britleness  
   B. Ductility  
   C. Malleability  
   D. Hardness  
   E. Toughness.  

13. Give the basic composition of:  
   a. Brass  
   b. Bronze  

14. List out the common heat – treatment operations.  

Section II. Answer any three (3) questions of your choice  
(Do not choose more than three questions).  

15. By drawing, show the terminology of an external screw threads illustrated by arrows bellow:  

16. a) Briefly describe any eight principal parts of the lathe.  
   b) What does the tampered hole do in milling operation?
17. A mild steel bar of 16mm diameter was tested for tensile strength with the gauge length of 60mm, the load applied was 96KN, the yield load was 54KN, the final diameter and length recorded were 8.85mm and 72mm respectively. Calculate:
a) Yield stress
b) Ultimate tensile stress
c) Tensile strain
d) Young’s Modulus
e) Percentage reduction in area and Percentage elongation.

18. Describe the principal parts of a Milling Machine and their functions.

19. Define the Guest’s or Tresca’s Theory.

Section III. Answer any one (1) question of your choice (Do not choose more than one question). 15marks

20. Fill in the table of troubles, causes and remedies while drilling operations. 15marks

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Probable causes</th>
<th>Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Rough hole</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2. Split up centre</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3. Hole larger than drill</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4. Breaking of drill in deep hole</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5. Chipping of the lip of cutting edges</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

21. List out the commonly used vices and the applications of each. 15marks

22. After naming the main parts of a horizontal milling machine below, describe briefly the role of each part as labeled. 15marks