CEL 2 & ETL 2 :
Technical Drawing and Knowledge of Materials

T097

Tuesday, 05/11/2013
1:30 - 4:30 PM

WORKFORCE DEVELOPMENT AUTHORITY

P.O.BOX 2707 Kigali, Rwanda Tel: (+250) 255113365

ADVANCED LEVEL NATIONAL EXAMINATIONS, 2013, TECHNICAL AND PROFESSIONAL TRADES

EXAM TITLE : Technical Drawing and Knowledge of Materials

OPTIONS: **- Computer Electronics (CEL)**

- Electronics and Telecommunication (ETL)

DURATION: **3hours**

INSTRUCTIONS:

The paper contains **three (3)** sections :

Section I: Sixteen **(16)** questions, all **Compulsory**; **55marks**

Section II: Five **(5)** questions, **Choose any three (3)**; **45marks**

Section III: Two **(2)** questions, **choose any ONE (1)** **15marks**

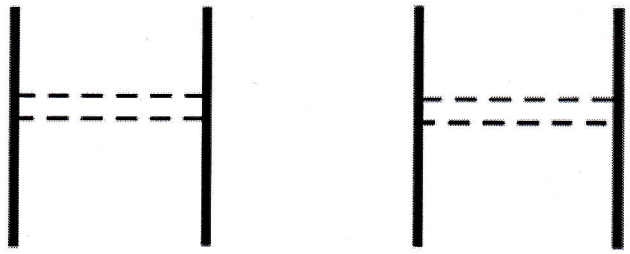
Section I: Attempt all the 12 questions 55marks

01. An object placed in natural position, which side of that object is preferred for the front view? **1mark**

02. How dimensions should be placed on isometric drawing? **2marks**

03. Which of the following representation is correct and why? **2marks**

a) **b)**



04. Where should the left side view be placed with reference to the front view? **2marks**

05. Describe steel materials. **2marks**

06. Identify different factors affecting material properties. **3marks**

07. Identify different types of metal and non-metallic materials. **4marks**

08. Identify different types of Steel. **4marks**

09. Identify four (4) the main alloying elements in cast irons. **4marks**

10. Given the standard size of A0 drawing sheet in mm (1189X841) find quickly the size of A1, A2, A3 and A4. **4marks**

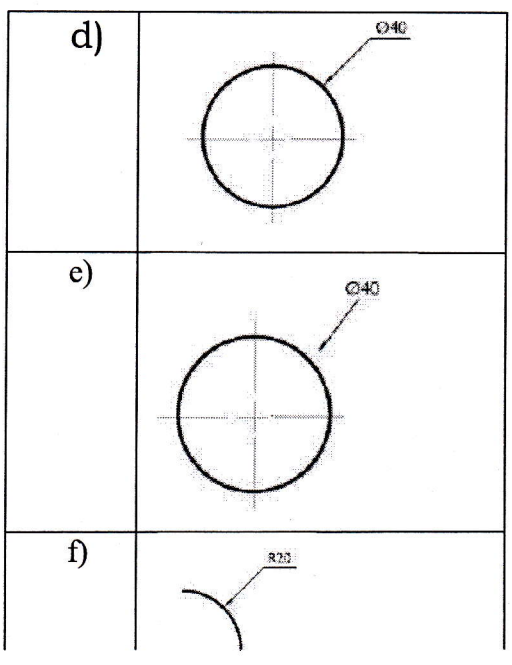
11. Identify different types of cast iron. **5marks**

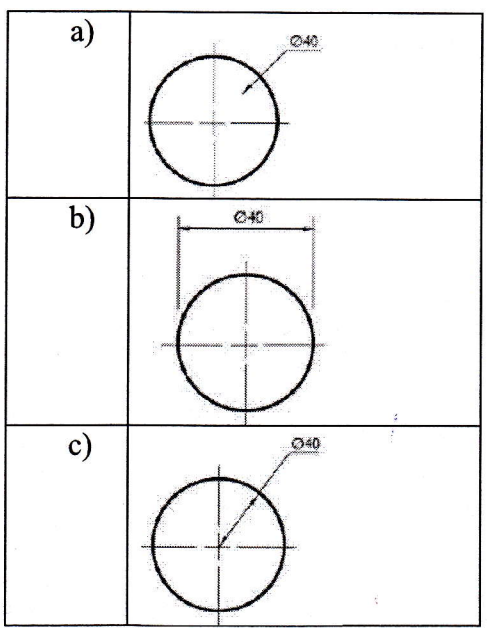
12. Identify five (5) different physical properties of materials. **5marks**

13. Identify five (5) different mechanical properties of materials. **5marks**

14. How does a working drawing differ from a picture drawing of an object? **6marks**

15. Determine the correct and incorrect dimensioning in the following: **6marks**





Section II: Choose and Answer any three (3) questions 30marks

16. Calculate the modulus of elasticity (in GPa) for a material which produces the following data when undergoing test : Applied load = 50 kN, Cross-sectional area = 25mm^2, Gauge length = 20 mm, Extension = 0.2 mm. **10marks**

17. **a)** What is stainless steel? **2marks**

    b) Describe the characteristics of different types of stainless steels? **8marks**

18. Identify plastics in the following list of materials : **10marks**

    Polyethylene, carbon fibre, polypropylene, polyvinyl chloride, porcelain, epoxies, alkyds, glass, polyesters, nylon, concrete, acrylic, Bakelite, PTFE, GRP.

19. **a)** Define corrosion and identify factors on which it depends. **6marks**

    b) Identify four (4) different types of protection from corrosion. **4marks**

20. **a)** Determine the drawing instrument used to perform the following tasks : **4marks**

    i) To draw lines at 30°, 60° and 45° to the vertical and horizontal.

    ii) To mark or measure angles between 0 and 360°.

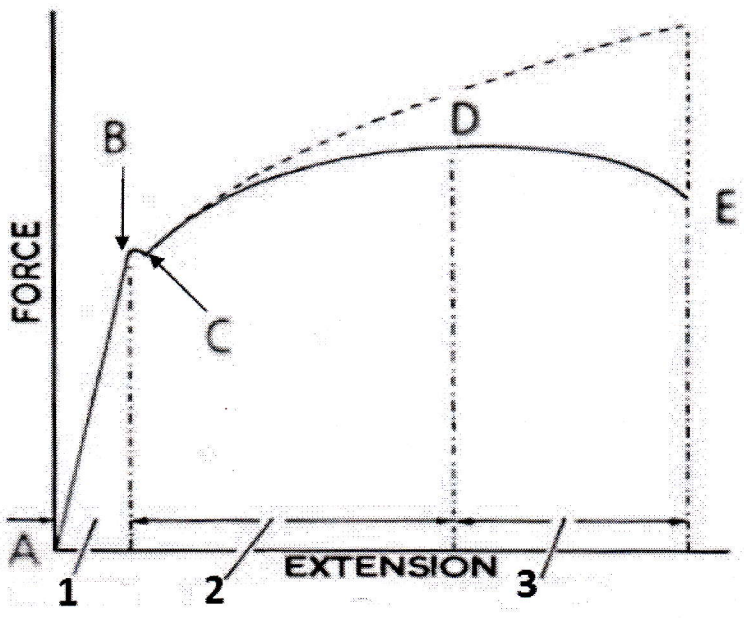
    iii) To fix the Drawing sheet on the Drawing board.

    iv) To draw circles and arcs of circles.

    b) Identify the characteristics of the most used type of projection in technical drawing. **6marks**

Section III : Choose and Answer any one (1) question 15marks

21. Consider the following Load-extension curve for X metal and answer to the questions:



a) Describe briefly the behavior of the metal X by specifying the relationship between extension and load, corresponding property and the behavior of X if the load is removed : **8marks**

i) Between points A and B

ii) Between points B and C

iii) Between points C and D

b) What represent specifically the points B, C, D and E? **4marks**

c) Identify the zones represented by numbers **1, 2** and **3** on the curve. **3marks**

22. Identify the element indicated by each one of letter A, B, C and D on the drawing bellow and give for each element its characteristics. **15marks**