CEL & ETL – Technical Drawing and Knowledge of Materials

T127

Thursday, 06/11/2014

8.30 – 11.30 AM

WORKFORCE DEVELOPMENT AUTHORITY

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ADVANCED LEVEL NATIONAL EXAMINATIONS, 2014
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 is composed of **three (3) main Sections** as follows:

Section **I**: Twelve **(12)** questions, all **Compulsory**. **55marks**

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

Section **III**: Three **(3)** questions, **Choose any One (1).** **15marks**

SECTION I. TWELVE (12) COMPULSORY QUESTIONS.

01. Differentiate stress from strain. **2marks**

02. Describe the principle of a dial indicator or dial gauge. **3marks**

03. Identify different types of Steel and specify why alloying additions are very important in steels. **5marks**

04. Which views are necessary to represent an object? **4marks**

05. What is the recommended line thickness in mm for object line, dimension line and hidden line respectively? **6marks**

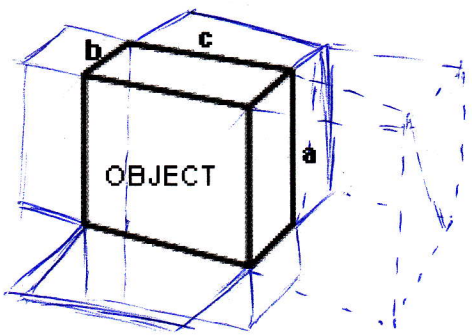
06. Which paper format is exclusively used in an upright position? **3marks**

07. Describe the properties of scales and give an example of scale. **7marks**

08. Describe what is sectioning or cutting and how the position of the cutting plane is indicated. **6marks**

09. Identify four (4) types of pencils based on their use. **4marks**

10. Given the following object with dimensions a x b x c, determine the horizontal spacing of its views if the drawing space (horizontal) is d. **5marks**



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

12. Identify the main components involved in a projection. **4marks**

SECTION II. ATTEMPT ANY THREE (3) QUESTIONS.

13. Describe the following terms used in technical drawing.

a) Orthographic projection

b) Isometric projection

c) Pictorial projection

d) Diametric projection

e) Axonometric projection **10marks**

14. Calculate the modulus of elasticity (in GPa) for a material which produces the following data when undergoing test: Applied load = 72kN, Cross-sectional area = 35mm^2, Gauge length = 23mm, Extension = 0.6mm. **10marks**

15. Identify the nature of ceramics materials and classify them in different groups. **10marks**

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

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

17. a) Specify the role of the following drawing instruments :

i) Protractor

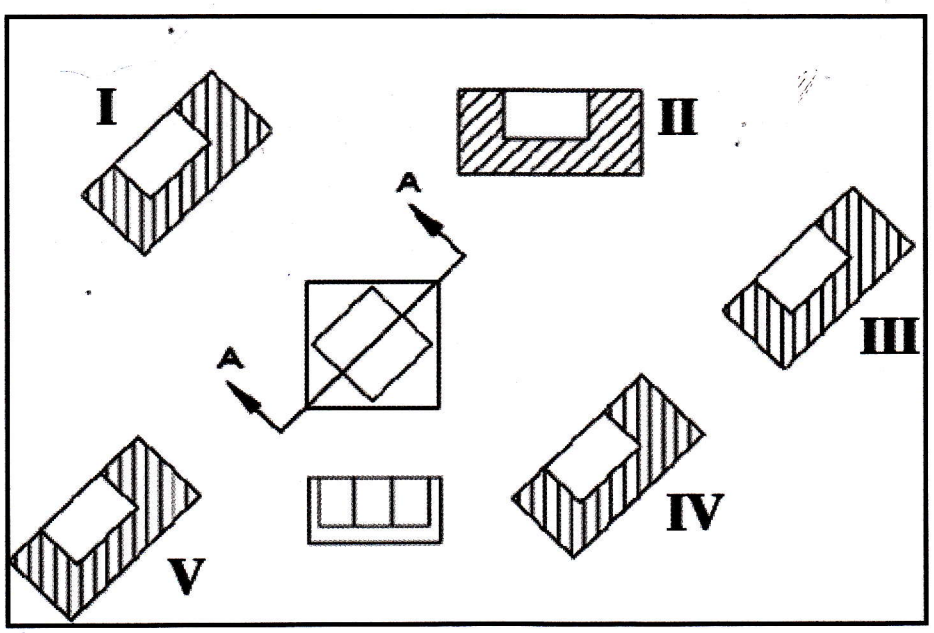
ii) Drawing Pins and Clips

iii) T-square

iv) Drafting machine

v) Set squares **5marks**

b) Comment on the following different positioning of the sectional view A-A represented by the numbers **I, II, III, IV** and **V.** **5marks**



SECTION III. ATTEMPT ANY ONE (1) QUESTION.

18. A tungsten material, 375mm long, is pulled in tension with a stress of 276MPa. If the deformation is entirely elastic, what will be the resultant elongation? Sketch the stress – strain diagram related to this situation. **15marks**

For complementary information, refer to the table below.

Room-Temperature Elastic and Shear Moduli, and Poisson's Ratio for Various Materials

Material	*Modulus of Elasticity*		*Shear Modulus*		*Poisson's Ratio*
	GPa	*10^6 psi*	*GPa*	*10^6 psi*	
	Metal Alloys				
Tungsten	407	59	160	23.2	0.28
Steel	207	30	83	12.0	0.30
Nickel	207	30	76	11.0	0.31
Titanium	107	15.5	45	6.5	0.34
Copper	110	16	46	6.7	0.34
Brass	97	14	37	5.4	0.34
Aluminum	69	10	25	3.6	0.33
Magnesium	45	6.5	17	2.5	0.35

19. Differentiate first angle projection from third angle projection and show their symbols. **15marks**

20. Discuss the different formats of standards drawing sheets. Specify the size in mm and in inches. **15marks**