**WORKFORCE DEVELOPMENT AUTHORITY**

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# ADVANCED LEVEL NATIONAL EXAMINATIONS 2013; TECHNICAL AND PROFESSIONAL TRADES

**EXAM TITLE:** Topography and Road Construction

**OPTION:** Public Works (PWO)

**DURATION:** 3hours

## INSTRUCTIONS:

The paper comprises **Three (3)** sections:

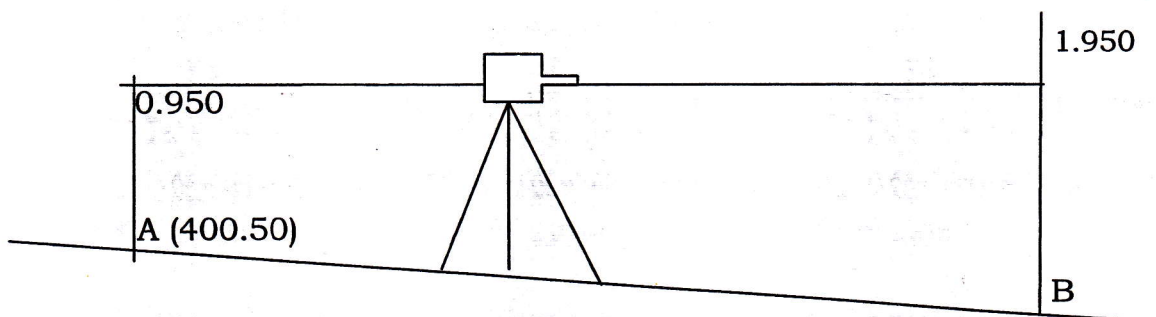**Section I**: Fifteen **(15)** questions, **all Compulsory;**      55marks

**Section II**: Five **(5)** questions, **Choose any three (3);**      30marks

**Section III**: Two **(2)** questions, **Choose any one (1);**      15marks

The use of calculator is admitted.

## Section I: All the 15 questions are Compulsory  55marks

**01.** Find the number of theoretical lines of the road if the opening of compass cut each other contour line into 2 points for 5 contours.                **3marks**

**02.** Give the advantages of interpolation method.                **2marks**

**03.** What are the two different curves of longitudinal profile of project?     **2marks**

**04.** Give all parts of side hill section.                **4marks**

**05.** Define the following terms :

    **a)** Earthwork moving                **1mark**

    **b)** Transport moment                **1mark**

    **c)** Fictive point                **1mark**

**06.** Give the model of table of earthwork moving.                **6marks**

**07.** What is an ideal road alignment in highway?                **4marks**

**08.** From the expression of design speed, find the expression of super elevation.

    **6marks**

**09.** Give all elements of cross-section.                **5marks**

**10.** The geometric volume of cut is 5m³. The coefficient of abundance is 20 %. Calculate the volume to bring for filling an avoid of 3 m³ if the coefficient of settling is 15%.                **5marks**

**11.** Using a sketch, shows an embankment of 8/4.                **3marks**

**12.** Calculate the length of circular curve (LC) whose radius "r" is 161 m and the central angle (B) = 130⁰ 45'.                **3marks**

    NB: π= 22/7

**13.** Consider the following sketch, find the altitude of point B.                **3marks**

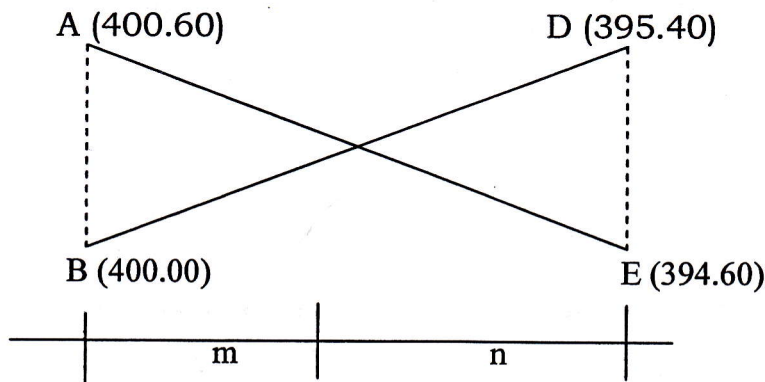**14.** Give the three different methods of leveling.  **3marks**

**15.** What are the three sources of errors in surveying?  **3marks**

## Section II: Choose and Answer any Three (3) questions.  30marks

**16.** Give the model of table of earthwork quantities in road construction.  **10marks**
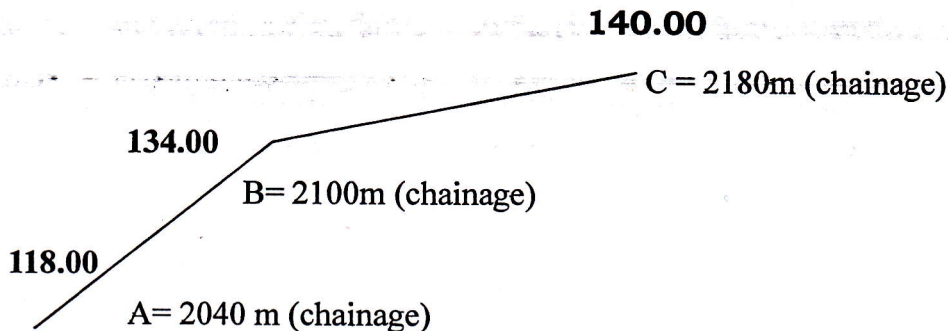
**17.** On the basis of the following data;

A (400.60)          D (395.40)

B (400.00)          E (394.60)

m          n

Calculate the distances m and n if m + n = 50m.  **10marks**

**18.** Consider the following data;

**140.00**

C = 2180m (chainage)

**134.00**

B= 2100m (chainage)

**118.00**

A= 2040 m (chainage)

a) Calculate the horizontal distances from A to B and from B to C.  **6marks**

b) Find the gradient of AB and BC if 118.00; 134.00 and 140.000 are altitudes of A, B and C respectively.  **4marks**

**19.** List 7 accessories instruments used in surveying and give 3 types of levels.

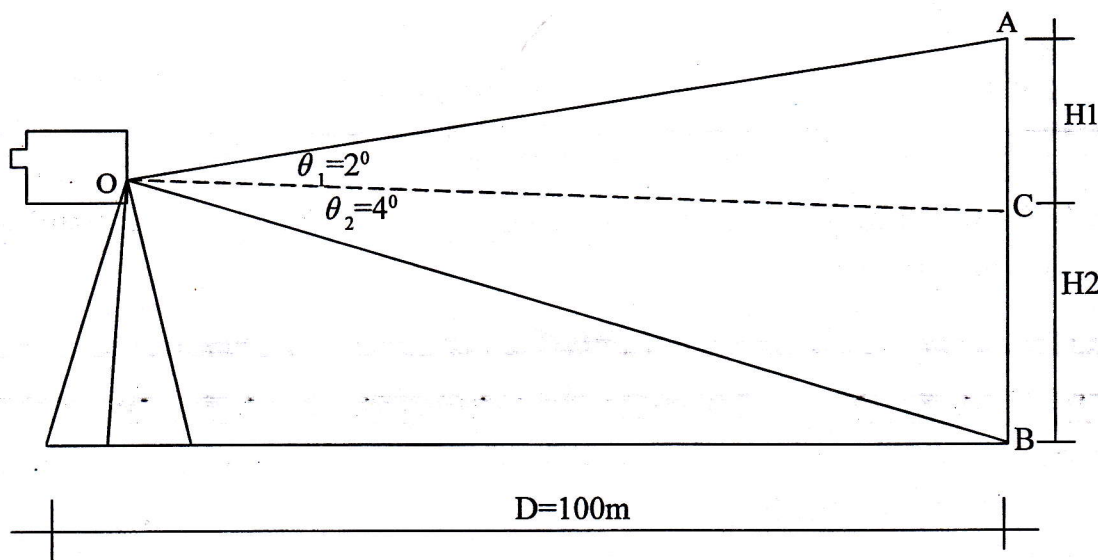**10marks**

**20.** Give 10 parts of dumpy level.  **10marks**

## Section III: Choose and Answer any One (1) question. 15marks

21. For a sag curve of longitudinal profile, it is required to connect a horizontal line with a gradient  and an upper word slope ($g_2$) of 0.04 by a parabolic curve. If the tangent length  T= 40.000m

    a) Calculate the total length of connecting (L).                    **2marks**

    b) Calculate the coordinates $X_s$ and $Y_s$ of summit of the parabolic curve. **10marks**

    c) Calculate the ordinate Y of point x set at 30m from summit of the parabolic curve.                                                  **3marks**

22. Observe the figure below :



    a) Find the height AB representing a building.                    **10marks**

    b) What is the method of leveling that is applied?                **1mark**

    c) Convert $\varnothing_1$ and $\varnothing_2$ in centesimal system.              **4marks**