EXAM TITLE: Surveying Applications

OPTION: Surveying (SUR)

DURATION: 3 hours

INSTRUCTIONS:

The paper is composed of three (3) main Sections as follows:

Section I: Fifteen (15) compulsory questions. 55 marks
Section II: Attempt any three (3) out of five questions. 30 marks
Section III: Attempt any one (1) out of three questions. 15 marks

Note:
Every candidate is required to carefully comply with the above instructions. Penalty measures will be applied on their strict consideration.
Section I. Fifteen (15) Compulsory questions

01. What do you understand by surveying?

02. Outline the six (6) applications of surveying?

03. The work of the surveyor which is mainly consists of making measurements can be divided into two parts: Field work and office work. Briefly discuss them.

04. The figure below indicates the control points A, B, C, D, E, F, in the area to be surveyed. It is required to obtain the coordinate positions of each point.

By which methods the practice could be done?

05. If a preliminary route survey is to be prepared for a proposed pipeline, discuss on three important procedures to be followed.

06. When developing a street layout plan for a new subdivision, a surveyor should do consultation where and for what reasons?

07. What is irrigation? What are the necessary factors that oversee the need for Irrigation?

08. List out at least six (6) direct benefits of irrigation.

09. After an irrigation water is taken from the sources by any of the techniques (Diversion from river or reservoir or pumped from the ground sources etc), it can be distributed to the agricultural field by different methods. Mention at least five methods that may be applied.
10. What do the following shapes mean?  

a)  

b)  

c)  

d)  

e)  

f)  

g)  

h)  

11. Outline the procedure that should be followed to come up with mass diagram.  

5 marks

12. While developing road projects making tentative alignment is necessary after primary investigation regarding the justification of construction of new road, give any five (5) key points that must be considered.  

5 marks

13. Before an irrigation project is undertaken, it should be examined whether the area concerned in fact needs to be irrigated. In line of this, what factors should be taken into consideration during the investigation.  

3 marks

14. Kigali city council decided to develop and expand water supply scheme. During the preparation it has been noticed that the demand is higher due to expansion of the city with new neighborhood second cities, hence a primary investigation has to be conducted on the concerned area and a primary report prepared regarding implementation of the scheme.  

Advise the points that should be noted during reconnaissance.  

3 marks

15. Location of site for rain gauge station depends on the topography of the catchment area. To get the proper rainfall records from the catchment area, the stations should be so selected that they fully cover the basin.  

List out the four (4) recommendations to be considered while selecting rain gauge station.  

4 marks
Section II. Choose and answer any three (3) questions. 30marks

16. The table below illustrates coordinates of a closed figure in meters.

<table>
<thead>
<tr>
<th>Points</th>
<th>North (Y)</th>
<th>East (X)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>100</td>
<td>802</td>
</tr>
<tr>
<td>B</td>
<td>711</td>
<td>802</td>
</tr>
<tr>
<td>C</td>
<td>635</td>
<td>852</td>
</tr>
<tr>
<td>D</td>
<td>994</td>
<td>902</td>
</tr>
<tr>
<td>E</td>
<td>241</td>
<td>952</td>
</tr>
<tr>
<td>F</td>
<td>884</td>
<td>1002</td>
</tr>
<tr>
<td>G</td>
<td>266</td>
<td>1052</td>
</tr>
<tr>
<td>H</td>
<td>811</td>
<td>1102</td>
</tr>
<tr>
<td>I</td>
<td>100</td>
<td>1102</td>
</tr>
</tbody>
</table>

Compute the area of the Figure using:

(1) Coordinate method.
(2) Trapezoidal rule. 10marks

17. The following consecutive readings were taken with a level and a 4 meter levelling staff on a continuous sloping ground at common intervals of 30 m:

<table>
<thead>
<tr>
<th>Reading (m)</th>
<th>Reading (m)</th>
<th>Reading (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 0.855</td>
<td>0.455</td>
<td>0.585</td>
</tr>
<tr>
<td>1.545</td>
<td>1.380</td>
<td>1.015</td>
</tr>
<tr>
<td>2.335</td>
<td>2.055</td>
<td>1.850</td>
</tr>
<tr>
<td>3.115</td>
<td>2.855</td>
<td>2.755</td>
</tr>
<tr>
<td>3.825</td>
<td>3.455</td>
<td>B 3.845</td>
</tr>
</tbody>
</table>

The reduced level of A was 380.500. Make entries in a level book and apply the usual checks.
Determine the gradient of AB. 10marks

18. What is the effect of miscentring a theodolite on the measured angle? Show that special care must be exercised in centring when sighting over short distances. 10marks
19. The figure below illustrates a curve joining straight lines AB, BC and CD in a road alignment. The following table shows recorded data during topographic survey.

<table>
<thead>
<tr>
<th>Straight</th>
<th>Bearing (°)</th>
<th>Distance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>34</td>
<td>735.70</td>
</tr>
<tr>
<td>BC</td>
<td>74</td>
<td>210.50</td>
</tr>
<tr>
<td>CD</td>
<td>124</td>
<td>640.40</td>
</tr>
</tbody>
</table>

Calculate:

a) The radius of the curve joining the straights,

b) The length of curve.

20. Hydrographic survey includes all types of hydrological investigations which are necessary for the design of hydraulic structures.

By the use of neat sketch, discuss the process of determination of cross-sectional area of a river:

a) When the river is small

b) When the river is large