

SECTION A: Attempt All questions**(55marks)**

01. Select the correct answer by circling its corresponding letter. **(3marks)**

A. One of the following types of terrains is a good example of negative fixed point (during the forest pathways construction).

- i. Swamp /wetland
- ii. Terrain with gentle slope
- iii. Terrain with clay soil
- iv. Terrain with more vegetation

B. The followings are the examples of positive fixed points EXCEPT:

- i. Terrain with gentle slope
- ii. Hard and compact soil
- iii. Non habited area
- iv. Terrain with rocky soil
- v. Unfertile/poor zone /area

C. The function of turning places is:

- a) To reduce the risk of accident
- b) To reduce the running velocity /speed
- c) To permit/ facilitate logs piling
- d) To allow to the vehicles to turn back / to turn around
- e) There is no correct answer

Answer:

A. Swamp /wetland. /1mark

B. Terrain with rocky soil. /1mark

C. There is no correct answer /1mark

02. Explain the reasons why the forest pathways in our country are constructed by using the system of soil cutting only. **(3marks)**

Answer:

In Rwanda, the construction of forest pathways is done entirely in soil excavation (cutting), this for three (3) main reasons:

- ✓ The mean slopes of land in our country is often superior to 60% and/1mark
- ✓ The construction by soil excavation and soil filling would only be possible with the construction of retaining walls, what is difficult to construct and expensive. /1mark
- ✓ All terracing works are done using hand tools without the use of sophisticated machine for fill compaction. /1mark

03. Identify the standard dimensions of the level peg used for picketing the forest pathway. **(4marks)**

Answer:

The standard measurements of Level peg are:

- ✓ Height: 70cm, /1mark

- ✓ Diameter: 3 to 5cm, /1mark
- ✓ Notch at 20cm (from the tip), /1mark
- ✓ Numbered on the top side. /1mark

04.A constructed forest pathway has a corner designated by using 12m radius. That forest pathway has 3m width. Remember that the admissible slope in the corner is 8%.

- a) Calculate the mean slope on that corner. **(2marks)**
 b) Is the obtained mean slope admissible? Yes, or Not. Explain your answer. **(2marks)**

Answer:

$$\text{a) Mean slope} = \left(\text{Admissible slope} \times \frac{\text{Internal radius}}{\text{Radius on axis}} \right) \times 100$$

$$\text{Internal radius} = \text{Radius on the axis} - \left(\frac{1}{2} \text{ Width of pathway} \right)$$

$$= 12\text{m} - \left(\frac{1}{2} \times 3\text{m} \right) = 10.5\text{m} / 1\text{mark}$$

$$\text{Mean slope} = \frac{8}{100} \times \frac{10.5\text{m}}{12\text{m}} \times 100 = 7\% / 1\text{mark}$$

- b) The obtained mean slope is not admissible, because it is over 6% /2marks

05. List out three (3) factors that determine the distance to measure from the level pegs and slope pegs during the picketing of the forest pathway.

(3marks)

Answer:

a) The factors that determine the distance to measure from the level pegs and slope pegs are:

1. Slope of land, /1mark
2. Width of pathway to construct, /1mark
3. Slope of embankment. /1mark

06. Identify at least three causes of forest pathways deterioration/ degradation. **(3marks)**

Answer:

The three (3) main cause of forest pathways deterioration are:

1. Non respect of the standard measures (simplified construction), /1mark
2. Bad climate especially, the rain. /1mark
3. Non compacted soil (soft soil). /1mark

07.Carefully, observe the following picture of Dumpy level (Telescope):

Name the equipment's parts numbered 1, 2, 3, 6 and 7 **(5marks)**



Answer:

Dumpy level / Telescope	Names of parts
	1. Focusing screw. / 1 mark 2. Eyepiece. / 1 mark 3. Footscrew. / 1 mark 6. Tangent screw. / 1 mark 7. Circular bubble. / 1 mark

08. Outline three (3) types of lines that a topographer can meet when collecting topographic data on the field. **(3marks)**

Answer:

Three (3) types of lines that a topographer can meet when collecting topographic data on the field are:

1. Straight line, / 1 mark
2. Broken lines, and / 1 mark
3. Bent (covered) lines. / 1 mark

09. State out five factors that may influence the construction's cost of a forest pathway? **(5marks)**

Answer:

The construction's cost of a forest pathway is influenced by the following factors:

- a) Cost of labour in the region, / 1 mark
- b) Cost of tools and equipment used, / 1 mark
- c) Soil nature, / 1 mark
- d) Climate / season, / 1 mark
- e) Width of the forest pathway to construct. / 1 mark

10.Whatever the constructed forest pathway deteriorates after several months of use. Illustrate at least five (5) the preventive measures to apply for preventing too much deterioration of a constructed forest pathway.

(5marks)

Answer:

The preventive measures to apply for preventing too much deterioration of a constructed forest pathway are:

- a) Respect the standard measures;
- b) Compact the running surface by using good material;
- c) Construct /provide required water evacuation system: ditch, outlet, gutter and bridge;
- d) Educate the drivers to use correctly the pathway;
- e) Conduct adequate land survey;
- f) Use trucks/ vehicles / respect the load bearing capacity of the constructed pathway;
- g) Apply regular maintenance.

*Consider five (5) answers. Each one carries **1mark***

11.List at least three (3) geographical coordinates that permit a topographer to localize and describe the site on which he is collecting the data.**(3marks)****Answer:**

Three (3) geographical coordinates that permit a topographer to localize and describe the site on which he is collecting the data are:

- a) Longitudes,
- b) Latitudes,
- c) Altitude /elevation,
- d) Bearing.

*Consider three (3) answers. Each one carries **1mark***

12.Convert the given data into the recommended unit. **(4marks)**

Data	Recommended unit
Slope of 24%	...?degrees
Slope of 45degrees	...%
Slope of 40grades	...degrees
Distance of 124050 centimeters	...Kilometers

Answer:

Data	Recommended unit

Slope of 84%	$\frac{84}{100} = 0.84 \tan^{-1} = 40^\circ / 1 \text{ mark}$
Slope of 45degrees	$\tan 45^\circ = 1 \times 100 = 100\% . / 1 \text{ mark}$
Slope of 40grades	$0.9 \times 40 \text{gr} = 36 \text{degrees} . / 1 \text{ mark}$
Distance of 124050cm	1.24o5 kilometers/ 1mark

13. Your School has the land on which the school manager would like to construct the tree nursery. That land has 45.0m length and 36.4m width. The school manager provides to you the sheet of paper having 28cm on 32cm. He is asking you to determine the suitable scale at which the map representing that land should be drawn. **(5marks)**

Answer:

$$\text{Scale for the length} = \frac{32\text{cm} - 2\text{cm}}{4,500\text{cm}} = \frac{30\text{cm}}{4,500\text{cm}} = \frac{1}{150} / 2 \text{ marks}$$

$$\text{Scale for the width} = \frac{28\text{cm} - 2\text{cm}}{3,640\text{cm}} = \frac{26\text{cm}}{3,640\text{cm}} = \frac{1}{140} / 2 \text{ marks}$$

Thus, the suitable scale for drawing the plan representing that land is 1/150 because it is the smallest one. / 1mark

14. A forest technician has constructed a corner the forest road having 4m width and 10meters radius. Unfortunately, the truck passes on that corner difficultly because that corner is tight! So the forest technician wants to increase the width of that corner so that to permit an easy circulation of trucks. When measured the distance between the ends of that corner he found 20m. Propose the distance to add for increasing the width of that corner. **(4marks)**

Answer:

Data: width of the pathway: 4m; Radius of the corner: 10m; Distance between the ends of the corner: 20m

$$\text{Minimal Radius} = \frac{\frac{1}{2} \text{Distance between the ends of the corner}]^2}{2 \times \text{width}} = \frac{\left(\frac{1}{2} 20\text{m}\right)^2}{8\text{m}} = 12.5\text{m} / 2 \text{ marks}$$

$$\text{Distance to add/ cut} = 12.5\text{m} - 10\text{m} = 2.5\text{m} / 2 \text{ marks}$$

SECTION B: Attempt any Three (3) questions

(30 marks)

15. Considering the map marked on your question paper. It is missing some information.



Found out at least five (5) map's elements that are lacking (missing) on that map. **(10marks)**

Answer:

Five (5) elements of a map that are missing on that map are:

1. Title, /2marks
2. Key or Legend, /2marks
3. Scale, /2marks
4. Compass direction arrow and /2marks
5. Frame. /2marks

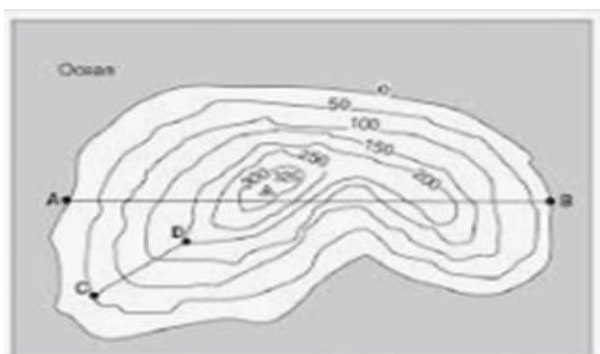
16. Some forest people say that it is necessary to stabilize the fill slope of a forest pathway; while other confirm that it is not necessary to do so.

Assess the two affirmations and decide the objectives of stabilizing the fill slope or not to do so. **(10marks)**

Answer:

- a) The correct affirmation is that "it is necessary to stabilize the fill slope" /2marks
- b) The objectives of stabilizing the fill slope are:
 - ✓ To ensure/ stabilize the bench; /2marks
 - ✓ To reduce the risk of soil erosion; /2marks
 - ✓ To avoid disconnecting (land sliding); /2marks
 - ✓ To have the logs for gutters repairing in the future. /2marks

17. The following figure shows you the sketch map that has been drawn at 1/2000 scale.



- a) Calculate the contour interval for the contour lines marked on your map. **(2marks)**
- b) Determine the altitude (elevation) in meter between C and D points.

(2marks)

d) Determine the slope (%) that is located between the contour marked **C** and the contour marked **D** if they are spaced by 24cm. **(6marks)**

Answer:

$$\text{a) Contour interval} = \frac{(200\text{m} - 50\text{m})}{3} = \frac{150\text{m}}{3} = 50\text{m} \quad /2\text{marks}$$

$$\text{b) Altitude / elevation} = 200\text{m} - 150\text{m} = 150\text{m} \quad /2\text{marks}$$

$$\text{Slope} = \frac{\text{Elevation}}{\text{Horizontal distance}} \times 100 \quad /2\text{marks}$$

$$\text{Horizontal distance} = 24\text{cm} \div \frac{1}{2000} = \frac{24\text{cm} \times 2000}{1} = 48000 \text{ cm} = 480\text{m} \quad /2\text{marks}$$

$$\text{Slope} = \frac{150\text{m}}{480\text{m}} \times 100 = 31.25\% \quad /2\text{marks}$$

18. Bridge is a structure that is built over a stream or river so that people or vehicles can cross from one side to another. Explain the criteria that a technician should consider before constructing a bridge in a given region.

(10marks)

Answer:

The criteria to consider before constructing a bridge are:

1. Watershed dimensions: This information allows the forest technician to data about the surface water width, water depth and river bed width.

2. Precipitation: highest water level in the river (per year) and the discharge of the river.

3. Sub-soil quality: (rock, gravel, firm soil, and sandy or clay soil).

4. Topographical condition, steep, gentle or weak slope.

5. Traffic intensity: on the forest pathways, the traffic intensity is not high, few vehicles run on the pathway per week, but during the forest harvesting activities, the circulation and weight of trucks will be increased.

6. Available economic means: cost of construction of the bridge.

Consider five (5) correct answers for 2marks each one

19. The picture bellow shows a damaged forest pathway.

a) What can you do for repairing that damaged forest pathway?

(6marks)

b) Propose the prevention measures to apply so that to minimize the forest pathways degradation. **(4marks)**



Answer:

The repairing of holes on the travel way (running surface) is done as follows:

- ✓ To fill in the holes on the travel-way by using gravel or laterite soil; /2marks
- ✓ To compact the applied laterite soil; /2marks
- ✓ To redo /reshape the profile. /2marks

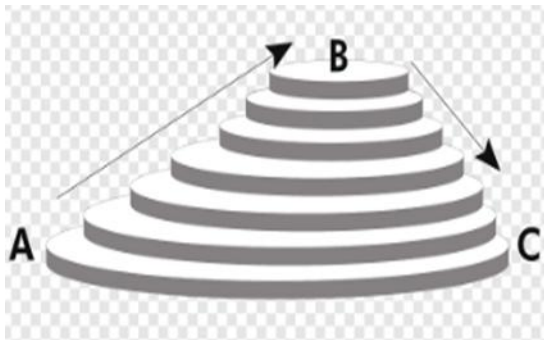
b) Prevention measures:

- ✓ To compact the running surface by using hard soil. /2marks
- ✓ To educate the drivers to use /the whole width of the travel way. /2marks

SECTION C: Attempt only one (1) question

(15 marks)

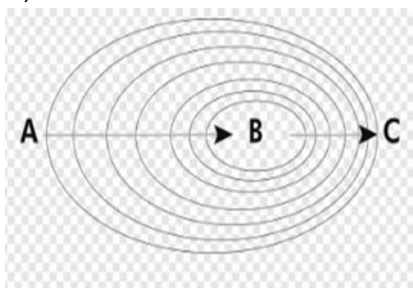
20. The following figure shows you a hill with its two sides AB and BC.



- a) Design contour lines representing that hill on your paper. **(5marks)**
- b) On which side of that hill the slope of land is weak? Justify your answer.**(5marks)**
- c) On which side of that hill the slope of land is high? Justify your answer.**(5marks)**

Answer:

a)



/5marks

b) The weak slope is located on AB side, because the contour lines are more spaced than on BC side. /5marks

c) The high slope is located on BC side, because the contour lines are more closed than on AB side. /5marks

21.a) During the forest pathway construction, the works should be done through daily work or working by task system. Compare the advantages and disadvantages of daily and working by task systems (for both worker and employer). **(15marks)**

Answer:

Working system	Advantages	Disadvantages
Daily working	Provides work of good quality.	Work takes long period.
	Worker obtains enough money.	Employer uses/ spends too much money.
Working by task	Work is done in short time.	Provides the work of low quality
	Worker obtains enough money	Require to be physically fit

Consider five (5) elements. **2marks** for each one

END OF ASSESSMENT!