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Ambo University Woliso Campus

School of Technology and Informatics

Department of Construction and Technology Management

Course name: *Highway Engineering*

Course code: *CENG3201*

COTM: 3th Year 2nd semester

Year: *MAY 2012/2019*

Instructor: Bona A. kumi (Msc, Highway Engineering)

Assignment in all chapters

Assignment - 1

Part I. discuss the following questions and write with clear answers.

1. Clearly explain the growth and development of transport in Ethiopia in general and particularly in highway transportation system.
2. What are the purposes of the road?

Assignment – 2

Part I. Give brief Answers for the listed questions below

1. What is transportation planning? And if there is no transportation planning what will be happened?
2. In construction projects, if there are many projects which one is selected for construction reason? List at least 6points, and clearly explain your points
3. Discuss the following terms
 - A. Forecasting Travel Demand
 - B. Demand Forecasts – Types
 - C. Urban Travel Demand Forecasts
4. What is transport system modeling? List and explain these models

Part II. Calculation

Q1. Assume there are 1000 trips being made between zones A and B, and that there are three mode available to make this trip. The utility of the individual modes is defined as

$$U_{\text{auto}} = 1 - 0.1\text{TT} - 0.05\text{TC}$$

$$U_{\text{bus}} = -0.1\text{TT} - 0.05\text{TC}$$

$$U_{\text{walk}} = -0.05 - 0.01\text{TT}$$

TC=Travel Cost (birr) and **TT**=Travel Time (min)

Predict how many people would be using each of the modes if: $\text{TT}_{\text{auto}}=5\text{min}$, $\text{TT}_{\text{bus}}=15\text{min}$, $\text{TT}_{\text{walk}}=20\text{min}$, $\text{TC}_{\text{auto}}=2\text{birr}$, and $\text{TC}_{\text{bus}}=1\text{birr}$.

Assignment – 3

Part I. FILL IN THE BLANK SPACE FOR THE FOLLOWING QUESTIONS

1. The position or the layout of the centre line of the highway on the ground is_____
2. _____Points are Areas requiring costly structures, highly developed expensive areas, marshes and low lying lands subject to flooding, hilly terrain where there is a possibility of landslides, etc.
3. _____Acquisition of land for the location of a transportation system that may cost much; shifting the alignment a little may reduce the cost considerably.
4. _____, _____, _____, _____, _____, are tasks done during final location survey.

5. After finishing _____ survey Select the most suitable alignment by conducting a comparative study considering economy, geometry etc.

Part II. Discuss the following questions

1. What are the complete sets of drawings for a road design?
2. List Criteria's to evaluate the most feasible routes and discuss each criterion briefly.
3. Discuss the main engineering surveys that are usually carried out for highway design.
4. What are the Factors Controlling Highway Alignment? Explain your points.
5. Why it is needed to Reconnaissance Surveys?

Assignment – 4

Clearly Solve The Following Problems,(Explain by using graphs/drawings/

1. A car is traveling at 30 mph in the country at night on a wet road through a 150 ft. long sag vertical curve. The entering grade is -2.4 percent and the exiting grade is 4.0 percent. A tree has fallen across the road at approximately the PVT. Assuming the driver cannot see the tree until it is lit by her headlights, is it reasonable to expect the driver to be able to stop before hitting the tree?
2. Similar to Example 1 but for a crest curve. A car is traveling at 30 mph in the country at night on a wet road through a 150 ft. long crest vertical curve. The entering grade is 3.0 percent and the exiting grade is -3.4 percent. A tree has fallen across the road at approximately the PVT. Is it reasonable to expect the driver to be able to stop before hitting the tree?

3. A roadway is being designed using a 45 mph design speed. One section of the roadway must go up and over a small hill with an entering grade of 3.2 percent and an existing grade of -2.0 percent. How long must the vertical curve be?
4. A horizontal curve is designed with a 1500 ft. radius. The tangent length is 400 ft. and the PT station is 20+00. What are the PI and PT stations?

Assignment – 5

Part I. Discuss the following questions

1. Discuss Earth Works Included during the road construction? And explain these works with their measure of quantities.
2. Write a note on the distribution Analysis of Earthwork Terminologies.

Part II. Calculation: solve the following questions clearly with required explanations, sketch's etc

1. If the cost of roadway excavation, C_e , is 800 cents/m³, cost of borrow, C_b , is 700 cents/m³, and cost of overhaul, C_{oh} , is 12 birr/m³-station, what is the economical length of overhaul? The free haul distance is 1.5km and a station is 100m long.
2. For the tabulated volume of cut and fill data given below:
 - A. draw the mass-haul diagram, and
 - B. estimate the total cost of excavating and moving earth
 - C. if, the cost of excavation is 6birr/m³, cost of borrow is 6 birr/m³, cost of overhaul is 12birr/station-m³, and the free haul distance is 1.1km. Use a shrinkage factor of 0.9.

Assignment – 6

1. What will be happened if you haven't provides drainage in highways? Write your answers in detail with advantages and disadvantages.
2. Make a brief note on the types of data needed for planning and location studies