

## QUALIFYING EXAMS IN TRANSPORTATION

The Exams are in four parts. The first three are written and the fourth oral. Each of the three written parts consists of six (6) questions and you have to answer four (4) of them in three (3) hours. They are closed-book exams, but whatever tables, graphs, equations, etc. that may be needed to answer the questions will be provided.

The content of the written parts is as follows:

### **PART I: Analytical Techniques**

It covers material on mathematics, statistics, optimization techniques and economics. It contains subjects taught primarily in Urban Systems Engineering (TRAN 650), Transportation Economics (TRAN 610), and Probability and Statistics (MATH 661). You should know how to solve problems involving the various probability distributions (e.g., binomial, Poisson, normal), setting up and solving linear programming and queueing problems, evaluating economically alternatives, and estimating costs for highway and public transportation operations.

### **PART II: Transportation Facilities and Operations**

It covers material associated primarily with traffic engineering. It contains subjects taught in Traffic Engineering Studies and Capacity (TRAN 615), Traffic Control (TRAN 752), Public Transportation Operations (TRAN 625), and Geometric Design (TRAN 552). You should know how to determine the capacity of various roadway facilities, individual and signal system timing, and the basic design concepts for highways.

### **PART III: Transportation Planning and Administration**

It covers material on transportation planning and the management of transportation facilities and operations. It contains subjects taught in Transportation Planning (TRAN 603), Distribution Logistics (TRAN 640), Mass Transportation Systems (TRAN 705), Transportation Finance (TRAN 643), GIS (TRAN/CE 602), Land Use Planning (TRAN 655), and Multimodal Freight Transportation System Analysis (TRAN 745). You should know the elements of the four-step transportation planning process, the uses of GIS, the pertinent issues associated with the management, finance and productivity assessment of transportation systems and carriers, and how to optimize the various elements of a logistics system and how those elements interact among them.

### **PART IV: Oral Examination**

The problem statement for this part is given immediately after Part III is completed and you usually have six (6) days to prepare a report and presentation. The instruction details for this part may vary from year to year and they should be read carefully and followed exactly. However, all recent oral exams involved the response to a current Request for Proposal (RFP).

After reading carefully the RFP given to you, you should do a literature review and prepare a written proposal, which you are also going to present to the faculty. Bring six copies of your proposal and your presentation (preferably Power Point) to the

examination location. You will be expected to speak 15-20 minutes about it, and then the program faculty will ask you questions about what you presented, or questions associated with the material covered in the written parts.

After reading carefully the RFP given to you, you should do a literature review and prepare a written proposal, which you are also going to present to the faculty. Bring six copies of your report and your presentation (preferably Power Point) to the examination location. You will be expected to speak 15-20 minutes about your findings, and then the program faculty will ask you questions about what you presented, or questions associated with the material covered in the written parts.

The written report and presentation is an individual effort. There should be no cooperation among students taking the exam at the time or anybody else. The appearance for the oral exam will be scheduled as students leave the room after they finish Part III. The oral exam usually does not last for more than one hour.

During the oral exam you are expected to exhibit good oral and written communication skills, the ability to think independently and perform innovative research, and a good general knowledge of transportation problems and issues and the techniques used to address them today.

There are various degrees of passing or failing the qualifying exams. At one extreme you can pass everything unconditionally. At the other extreme you can fail, and may take everything again next year (you are allowed a total of two chances). You can also pass some parts and not others. In such a case, you will have to take the part(s) you did not pass next year. It is also possible, if you show weakness in a particular area (including the presentation skills), to be asked to take some course(s) in that area.