

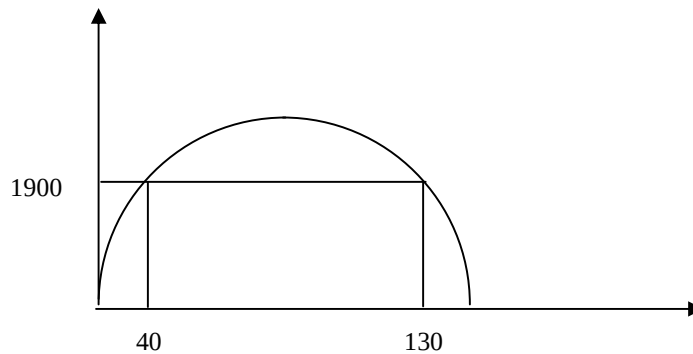
SHEET (3)
TRAFFIC FLOW MODELS

1. A traffic has resulted in a calibrated speed-density relationship for a particular freeway as follows:

$$U = 60 (1 - 0.007 K)$$

- a) Find the free-flow speed and jam density.
- b) Derive equations describing flow versus speed and flow versus density.
- c) Determine the capacity this freeway.
- d) Sketch the speed-density, flow-speed, and flow-density curves.

2. The speed-density relationship is linear and the Q-K curve is as depicted in the figure below. Show how you can express the average speed in terms of the traffic density only.



3. Fit the speed-density data, given in the table below, to both Greenshield's and Greenberg's traffic flow models.
- a) In your opinion, which model better represents the collected field data?
- b) Estimate the capacity, critical speed, and critical density under both traffic flow models.

Speed (mph)	Density (vpm)
53.2	20
48.1	27
44.8	35
40.1	44
37.3	52
35.2	58
34.1	60

Speed (mph)	Density (vpm)
27.2	64
20.4	70
17.5	75
14.6	82
13.1	90
11.2	100
8	115