



(25 marks)

Question 1

- 1- Talk about the physical properties of asphalt?
- 2- Discuss each cutback asphalt and air blowing asphalt?
- 4- Explain the following Superpave tests of asphalt sample clearing the purpose of each test, sample preparation, and test performing:
 - a) Rolling Thin Film Oven (RTFO)
 - b) Dynamic Shear Rheometer (DSR)
 - c) Binding Beam Rheometer (BBR)
 - d) Direct Tension Test (DTT)

Question 2

(25 marks)

- 1- Compare between the following:
 - a) Saybolt furol viscosity and Engler's viscosity test;
 - b) Liquid asphalts and asphalt emulsions.
 - c) Penetration test and softening point test.
 - d) Seal coat and prime coat.
 - e) Binder course and surface course.
 - f) Bitumen and Tars (discuss different types).
- 2- Discuss the asphalt modifiers?

Question 3

(25 marks)

- 1- A mix contains 5% air voids and contains coarse aggregate ($G_s = 2.69$), fine aggregate ($G_s = 2.91$) and filler ($G_s = 2.94$) in proportions 65 : 25 : 10 by weight, these aggregates mixed with asphalt cement ($G_s = 1.01$) and compacted to a unit weight of 2.43 gm/cm^3 , How much of asphalt content can be used ?
- 2- Compare between (Hveem Method, Marshall Method and Superpave Method)?
- 3- Discuss the asphalt behavior as a function of its chemical constituents?
- 4- Talk about the methods for improving the characteristics of bituminous materials?

Question 4

(25 marks)

- 1- Define the foamed Asphalt? Illustrating its uses? Advantages? And its effect on asphalt viscosity?
- 2- What are the objectives and components of Superpave program?
- 3- Talk about the self-healing asphalt?
- 4- Define the rubberized asphalt? Illustrating its benefits? and its uses in practical cases?
- 5- Define and illustrate the factors that affect on:
 - a) Stability
 - b) Durability
 - c) Flexibility
 - d) Skid resistance

*With my best wishes
Dr. Ahmed Abu El-Maaty*

This exam measures the following ILOs (Intended Learning Outcomes)

Question No.	ILOs
1	A-1, A-2, B-3, C-2
2	A-3, B-4, B-5, C-1, C-2, D-3, D-6
3	B-4, B-5, A-4, D-4, C-1
4	A-2, C-3, B-4, D-5, C-2