



Question 1

(20 marks)

- 1- Mention the different types of Asphalt? Explaining them in details?
- 2- How does the oxidation affect the characteristics of Asphalt?
- 3- What is the asphalt cement grading? And compare among them from the purpose of usage?
- 4- Compare between :
 - a) Asphalt – Tar characteristics.
 - b) Saybolt furol viscosity and Engler`s viscosity test.
 - c) Penetration test and softening point test.

Question 2

(25 marks)

- 1- Discuss the following tests:
 - ductility test
 - flash point test
 - solubility test
- 2- What are the objectives and components of Superpave program?
- 3- Explain the following Superpave tests of asphalt sample clearing the purpose of each test, sample preparation, and test performing:
 - Rolling Thin Film Oven (RTFO)
 - Dynamic Shear Rheometer (DSR)
 - Binding Beam Rheometer (BBR)
 - Direct Tension Test (DTT)

Question 3

(15 marks)

1- A hot asphalt concrete mix has a unit weight 2.5 t/m^3 when compacted to 94% of the maximum theoretical density, knowing the following about its constituents. find its percent asphalt content by weight of the total mix?

Material	Specific gravity	% in mix .
Coarse aggregate	2.65	52
Fine aggregate	2.70	40
Mineral aggregate	2.80	8
Asphalt cement	1.02	--

2- The grain size analysis of an aggregate is as the following:

Sieve NO.	4	10	40	60	100	200
% passing	60	56	30	19	13	10

If the previous aggregate used in a surface mixture, determine the approximate value for bitumen content in the mixture?

Question 4

(25 marks)

- 1- Define the rubberized asphalt? Illustrating its benefits? And its uses in practical cases?
- 2- What are the disadvantages of rubber asphalt? Illustrating its standard mixing ratio?
- 3- Talk about the two main methods for improving the characteristics of bituminous materials?
- 4- Talk about the effect of additives and other factors on tensile strength of asphalt paving mixtures?
- 5- Discuss Modification of Asphalt Mixture Performance by Rubber-Silicone Additive?
- 6- Discuss the impact of polypropylene fiber content on temperature susceptibility of dense graded mixtures?

Question 5

(15 marks)

- 1- Define the foamed Asphalt? Illustrating its uses? Advantages? And its effect on asphalt viscosity?
- 2- Define and illustrate the factors that affect on:
 - Stability
 - Durability
 - Flexibility
 - Skid resistance
- 3- Talk about "raveling" illustrating its reasons and solutions?
- 4- Talk about "stripping" illustrating its reasons and solutions?

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, D-7
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
5	A-1, B-3, B-4, C-2, D-3, D-7