Minufiya University
Faculty of Engineering
Civil Engineering Dept.
Final Examination, 2016

Highway Bituminous Materials
Code: CVE528
Time Allowed: 3 Hours
Date: 18 /6/2016

Question1 *(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 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 *(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 are 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 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
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	C-1, B-4, B-5, A-4, D-4, C-2