Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E –Ist SEMESTER–EXAMINATION – JULY- 2012

Subject code: 711903N Date: 09/07/2012

Subject Name: Highway Materials & Testing

Time: 2:30 pm – 05:00 pm Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** A bituminous mixture contains 65 % coarse aggregate, 35 % fine aggregate & 5 % asphalt (by weight of mixture). Determine the unit weight of the mixture, if after compaction it contains 70 % air voids. The specific gravities of the materials are coarse aggregate = 2.72, fine aggregate = 2.66 and asphalt = 1.00. **07**

(b) Calculate VMA, VIM, VFB for following data: **07**

i) Percent of bitumen = 5 %.
ii) Specific gravity of bitumen = 1.02.
iii) Specific gravity of aggregate = 2.80.
iv) Percent bitumen absorbed by aggregate = 0.56.
v) Specific gravity of test specimen = 2.479.

Q.2 **(a)** Define the following: **07**
Flushing asphalt, cape seal, kinematics viscosity, foamed asphalt, stone mastic asphalt, asphalt rubber binder, polymer.

(b) Explain two aggregate blending by analytical method. **07**

OR

(b) What do you mean by 60/70 and 80/100 grade of bitumen? State the application of these grades in field. **07**

Q.3 **(a)** What are the constituents, properties and uses of emulsions? **07**

(b) State to explain chemical composition of bituminous material. **07**

OR

Q.3 **(a)** Describe with the help of sketch how the abrasion is determined for a given sample of rock in a highway testing lab. **07**

(b) Differentiate between bitumen and tar. **07**

Q.4 **(a)** Describe the factors which should be considered to make a rational approach in the design of bituminous mix. **07**

(b) State the requirements for applications of elastomeric rubber modified bitumen as stress absorbing membrane. **07**

OR

Q.4 **(a)** Describe Hubbard-field test. What is the difference between this test and Marshall test? **07**

(b) State the specification and handling of modified binder and mixes at site. **07**

Q.5 **(a)** Explain the effect of fibre aspect ratio on workability of fibre reinforced concrete. **07**

(b) Mention the procedure used in the design of a concrete mix using Road Note No. 4 **07**

OR

Q.5 **(a)** State the improved serviceability conditions obtained in fibre concretes reinforced by conventional steel bars. **07**

(b) State the information which the site engineer should give while giving material for concrete mix design as per IRC to the mix design laboratory. **07**

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