Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

ME Semester –I Examination Feb. - 2012

Subject code: 711903N **Date: 17/02/2012**
Subject Name: Highway Materials and Testing
Time: 10.30 am – 01.00 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)** Define bulk specific gravity, apparent specific gravity and absolute specific gravity. Also find specific gravity, apparent specific gravity and water absorption for aggregate passing 40 mm and retained on 10 mm for the following observations: **07**

1)	Weight of basket	110 gms.
2)	Weight of basket and sample	960 gms
3)	Weight of saturated surface dry sample	1310 gms
4)	Weight of oven dried sample : C	1280 gms

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

Q.2 **(a)** State the significance of elastic recovery test of bitumen. How you will determine elastic recovery of it. **07**

(b) How do you determine the softening point of bitumen and state the lacuna in this test. **07**

OR

(b) Describe the penetration test and state the lacuna of this test. **07**

Q.3 **(a)** Explain the procedure of Marshall method of bituminous mix design. **07**

(b) How is road tar obtained? State the classification and uses of road tar. **07**

OR

Q.3 **(a)** Explain the classification of meltenes in detail. **07**

(b) Explain briefly the bitumen constitution and process of rheology. **07**

Q.4 **(a)** Explain the general guidelines for adjusting trial mix for the determination of optimum binder content for bituminous mix design. **07**

(b) Why importance has to be given to aggregate grading for road construction? Briefly explain Rothfutch"s method of mixing the aggregate to obtain the specified grading. **07**

OR

Q.4 **(a)** Find out the mix calculations for proportioning of volume of coarse aggregate and fine aggregate for zone II =0.64 per unit volume of total **07**

aggregate from the following data:
Grade designation = M40, OPC 43 grade cement, Specific gravity of cement = 3.15, Specific gravity of coarse aggregate = 2.74, Specific gravity of fine aggregate = 2.62, Specific gravity of admixture = 1.2, mass of chemical admixture = 2.50 kg/m^3, water content = 158 kg/m^3, cement content = 416 kg/m^3, volume of fine aggregate content = 0.36 per unit volume of total aggregate.

(b) State the types of additives for bitumen modifier with dosage. **07**

Q.5 **(a)** State the standard requirements of SFRC as laid down in IRC: SP: 46-1997. **07**

(b) State the applications of rubber and polymer modified bitumen. **07**

OR

Q.5 **(a)** State the names of different types of concrete mix design. Explain the steps for the mix design according to road note no. 4. **07**

(b) State the requirement of polymer modified binder (PMB) 70 grade. **07**

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