Texto # 1: **Better light switches**

A pair of research papers promises improvements in optical modulators, the light switches that encode data into light beams for data communications. One could lead to a 100-fold speed up of telecommunications and the other provides a relatively inexpensive way of building optical modulators into silicon computer chips.

Researchers from the University of California at Santa Barbara, NASA and the Georgia Institute of Technology used a powerful electric field to push a quantum well optical modulator to nearly 4 terahertz, or trillion times per second. Quantum wells are made of extremely thin layers of semiconductor that confine electrons to a plane.

At such high frequencies relatively low-power communications-wavelength light beams can be used to control each other, opening the way for much faster data flow through fiber-optic communications lines.

Meanwhile, researchers from Stanford University and Hewlett-Packard Laboratories have made an optical modulator from a stack of multiple quantum wells made from relatively inexpensive silicon and germanium. Existing similar devices use more expensive compound semiconductors that are not easily integrated with silicon computer chips.

This second advance promises cheap, miniaturized communications devices like the switches that route traffic in telecommunications networks.

(Quantum Coherence in an Optical Modulator, *Science*, October 28, 2005 and Strong Quantum-Confined Find Stark Effect in Germanium Quantum-Well Structures on Silicon, *Nature*, October 27, 2005)

Texto # 2: **Dynamic Response of Three Fiber Reinforced Polymer Composite Bridges**

J. Bridge Engrg., Volume 10, Issue 6, pp. 722-730 (November/December 2005)

Srinivas Aluri,[1] Chandrashekar Jinka,[2] and Hota V. S. GangaRao,[3] F.ASCE

Fiber reinforced polymer (FRP) composite bridge decks are gaining the attention of bridge owners because of their light self-weight, corrosion resistance, and ease of installation. Constructed Facilities Center at West Virginia University working with the Federal Highway Administration and West Virginia Department of Transportation has developed three different FRP decking systems and installed several FRP deck bridges in West Virginia. These FRP bridge decks are lighter in weight than comparable concrete systems and therefore their dynamic performance is equally as important as their static performance. In the current study dynamic tests were performed on three FRP deck bridges, namely, Katy Truss Bridge, Market Street Bridge, and Laurel Lick Bridge, in the state of West Virginia. The dynamic response parameters evaluated for the three bridges include dynamic load allowance (DLA) factors, natural frequencies, damping ratios, and deck accelerations caused by moving test trucks. It was found that the DLA factors for Katy Truss and Market Street bridges are within the AASHTO 1998 LRFD specifications, but the deck accelerations were found to be high for both these bridges. DLA factors for Laurel Lick bridge were found to be as high as 93% against the typical design value of 33%; however absolute deck stress induced by vehicle loads is less than 10% of the deck ultimate stress.

Texto # 3: **Corrosion protection and mechanical performance of SiO2**

Author(s): Giuseppe Moretti, Francesca Guidi, Roberto Canton, Marino Battagliarin, Gilberto Rossetto

Abstract: To evaluate the corrosion performance and nano-mechanical behaviour of a brass substrate covered by different thick SiO2 layers deposited by means of plasma enhanced chemical vapour deposition (PECVD) technique. The comparison between laboratory and “industrial” objects revealed a very good corrosion behaviour and good mechanical performance of both of them: in particular it was possible to modulate the surface treatment to solve various problems from the industrial point of view. It was possible to reduce the Cu migration into the SiO2 coating during the PECVD deposition at a negligible level and to control it by the deposition; further, the nano-indentation tests revealed the great utility of the coating annealing in obtaining a significant improvement of the mechanical properties of the coated objects. Even if some industrial problems were solved (minimization of the presence of the coating defects and transparency of the coatings), some on the layer hardness (anti-wear behaviour of the industrial objects) has to be better investigated and possibly solved.

Universidad de Carabobo
Área de Estudios de Postgrado
Facultad de Ingeniería

Nombre: _____
C.I.: _____
Examen Modelo 7

Examen de Suficiencia de Inglés

Responda, en castellano, las siguientes preguntas de acuerdo con la información contenida en los respectivos textos.

Texto # 1: "Better light switches"

1. ¿Cuáles son las mejoras que presentan los moduladores ópticos reportados en los dos estudios de investigación mencionados en el texto? (2 pts.)

_____
_____
_____
_____

2. ¿Qué se puede lograr a la frecuencia de casi 4 teraherts? ¿qué ventajas ofrece? (3 pts.)

_____
_____
_____
_____
_____
_____
_____

3. ¿Qué han desarrollado los investigadores de la Universidad de Stanford y los laboratorios Hewlett-Packard? ¿Cuál es la mejora que ofrecen? (3 pts.)

_____
_____
_____
_____
_____
_____

Texto # 2: “Dynamic Response of Three Fiber Reinforced Polymer Composite Bridges”

4. ¿Qué tipo de plataformas están llamando la atención de los dueños de puentes y por qué? (2 pts.)

5. ¿Cuáles fueron los parámetros de respuesta dinámica evaluados en el estudio? (3 pts.)

Texto # 3: “Corrosion protection and mechanical performance of SiO2”

6. ¿Cuál es el objetivo del estudio? (3 pts.)

7. Proporcione los 2 últimos hallazgos del estudio. (4 pts.)