Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER 2012

Subject code: 713102N Date: 09/01/2013

Subject Name: Biosensors & Biomems

Time: 02.30 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)**	Design rectifier and filter for 30V/3A regulated power supply using transistor as series pass element with fold back protection of 2:1.	**14**
Q.2	**(a)**	State the advantages and disadvantages of thermocouple for temperature measurement. Design a signal conditioning circuit for temperature measurement using thermocouple.	**07**
	(b)	Explain the principle of operation of LVDT. Derive its transfer function in terms fo E_0 and I_p.	**07**
		OR	
	(b)	Explain the theory of operation and applications of IR radiation thermometers.	**07**
Q.3	**(a)**	Write a short note on strain measurement using strain gauge. Derive the equation for gauge factor.	**07**
	(b)	Explain the four electrode liquid conductivity measurement. Design and explain it signal conditioning circuit.	**07**
		OR	
Q.3	**(a)**	Write a short note on force measurement using beam type load cell. Design the circuit for load cell interface.	**07**
	(b)	Design and Explain the capacitance type liquid level sensing.	**07**
Q.4	**(a)**	Explain the design of BioMEMS devices. State and explain briefly the MEMS process steps.	**07**
	(b)	Write a short note on future applications of MEMS in medical industry.	**07**
		OR	
Q.4	**(a)**	Write a short note on MEMS in drug delivery systems.	**07**
	(b)	Write a short note on hurdles for MEMS devices in medical applications.	**07**
Q.5	**(a)**	Write a short note on silicon as a sensing material.	**07**
	(b)	Write a short note on transit time ultrasonic flow meter.	**07**
		OR	
Q.5	**(a)**	Explain any 10 sensor characteristics briefly.	**07**
	(b)	Write a short note on micro-flow sensors.	**07**

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