Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER • 2014

Subject code: 713101N **Date: 01-12-2014**

Subject Name: Medical System Design

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)**	Design 15V/2A regulated power supply with fold back current protection circuit. Where, V_{in}=230 $\pm$20%, I_{pri} =190mA. (Assume Ripple Voltage: 10% of V_o)	**10**
	(b)	Sketch Necessary Voltage Wave form at every stage of Above Power supply design.	**04**
Q.2	**(a)**	Enlist ideal Operation Amplifier Characteristics.	**07**
	(b)	Explain Constant current limiting circuit with necessary safe operating area.	**07**
		OR	
	(b)	Explain fold back current limiting circuit with necessary safe operating area.	**07**
Q.3	**(a)**	Explain Current –Voltage Converters.	**07**
	(b)	Explain Instrumentation Amplifier with its advantages.	**07**
		OR	
Q.3	**(a)**	Explain Voltage-Current Converters.	**07**
	(b)	Derive Equation for V_{CM} and V_{DM} for Difference Amplifier.	**07**
Q.4	**(a)**	Explain Op-amp as a Voltage Comparator with any one application in detail.	**07**
	(b)	A type OP27 op-amp has the following specifications. Large signal voltage gain= 8 x10^5, CMRR= 94db, SVRR=86db, e_{na}= 3nv/Hz, Input Noise Current I_{na}= 0.4pA/Hz, f_{ci} =140Hz. Compute the AC errors of the amplifier in the frequency band 1Hz to 333Hz. Calculate the n bit accuracy for the full scale output voltage of 10V AC(peak to peak)	**07**
		OR	
Q.4	**(a)**	Derive the equation for ΔV_T for Non Inverting Schmitt Trigger.	**07**
	(b)	Explain sample and Hold Circuit & determine acquisition time to 0.1% full scale or a 10V step input with C_H= 10nf and R_{ON} = 300Ω.	**07**
Q.5	**(a)**	Explain PLL and explain its operation in Locked Condition.	**07**
	(b)	Explain 4-bit approximation A to D converter.	**07**
		OR	
Q.5	**(a)**	Explain Logarithmic Characteristic and transdiode configuration of amplifier.	**07**
	(b)	Write a short note on Pipe Line structured ADC.	**07**

****