Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- IVth SEMESTER–EXAMINATION – MAY/JUNE- 2012

Subject code: 141101 **Date: 25/05/2012**

Subject Name: Advance Electronics

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)**	Derive CE current gain for finite value Resistive load using π model and prove that 3-dB band width of this configuration is inversely proportional to the value of the resistive load	**07**
	(b)	Classify distortion in an amplifier and explain each, briefly	**07**
Q.2	**(a)**	Multistage amplifier consists of 3-stages and voltage gain of each stage is 50, 60 and 80 respectively. Find (1) Overall gain in dB (2) if multi stage input is 10 μV, what is the final output?	**07**
	(b)	Describe the principle of crystal oscillator along with its equivalent circuit	**07**
		OR	
	(b)	What is diffusion capacitance? Derive value of diffusion capacitance in terms of physical parameters of transistor	**07**
Q.3	**(a)**	Draw equivalent circuit of voltage & current amplifier and discuss on the value of input and output impedance. Also Classify distortion in an amplifier and explain each, briefly	**07**
	(b)	CE transistor hybrid π model parameters are as follows: $g_m = 50$ mA/V, $r_{b'e} = 1K\Omega$, $r_{bb'} = 10\Omega$, , $C_{b'e} = 101$ pF, $C_{b'c} = 3.5$ pF. Find (1)3-dB bandwidth for $R_L = 1K\Omega$ (2) Gain at 1 MHz frequency	**07**
		OR	
Q.3	**(a)**	Discuss validity of hybrid π model and prove that the model is valid up to one third of f_T	**07**
	(b)	Frequency sensitive arm of Wein-bridge oscillator uses $R_1 = R_2 = 10$ kΩ while $C_1 = C_2$,is kept variable. Find Minimum and maximum value of Capacitance to achieve output frequency range from 20 KHz to 70 KHz	**07**
Q.4	**(a)**	Explain emitter coupled differential amplifier in brief. How its performance can be improved	**07**
	(b)	Derive gain equation for Op Amp for inverting and non inverting mode and derive equation for Common mode rejection Ratio (CMRR). Why CMRR should be ideally high.	**07**
		OR	
Q.4	**(a)**	List the characteristic of Ideal Op Amp. Two set of inputs for differential amplifier are (i) $V_1 = 100$ μV, (ii) $V_2 = -100$ μV & $V_1 = 1100$ μV, (ii) $V_2 = 900$ μV. For CMRR = 200 Calculate %difference in output Voltage. If CMRR changed to 20000. Calculate %difference in output Voltage	**07**
	(b)	Discuss the effect of positive feedback and negative feed back on a transistor amplifier circuit. Which feed back improves the stability? Which one creates instability & what is the application of feed back which create the instability? Explain with appropriate condition	**07**

Q.5	**(a)**	Draw NOR gate circuit using RTL logic. Explain its operation and list disadvantages	**07**
	(b)	Explain requirement of Digital to Analog converter and draw and explain the weighted resistor type (4-bit) Digital to Analog converter.	**07**

OR

Q.5	**(a)**	Draw circuit of two input TTL NAND GATE. Explain its working. Compare it with RTL in terms of speed and power consumption with reasoning	**07**
	(b)	Draw and explain track type analog to digital converter. In terms of speed is it better than the counter type ? Give reason in support to your answer	**07**

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