	TUTE OF NOLOGY		USN									* CELEBRAHI * * CE	STITUTE OF TECH	CMRIT	
Internal Assesment Test - II															
Sub:	ib: MICROELECTRONICS CIRC			CUITS				Code: 1		15E	15EC655				
Date:	22/ 05/2018	Duration:	90 mins	N	Max M	larks:	50	Sem	n: VI	Bra	nch:	Profess Elective			
			Answer	Any	FIVE I	FULL	Quest	ions							
	<b>.</b>						Mar	ks_	OBE						
							Wanks		O	RBT					
	1. Consider a common-gate amplifier with active loads specified as follows: W/L= 7.2 $\mu$ m/0.36 $\mu$ m, $\mu$ nCox=387 $\mu$ A/V², r <sub>0</sub> =18 $\mu$ CO1 L1 R <sub>S</sub> =10 $\mu$ CO2, R <sub>S</sub> =10 $\mu$ CO3 $\mu$ CO4 $\mu$ CO4 $\mu$ CO3 $\mu$ CO3 $\mu$ CO3 $\mu$ CO4 $\mu$ CO4 $\mu$ CO4 $\mu$ CO5 $\mu$ CO5 $\mu$ CO5 $\mu$ CO5 $\mu$ CO5 $\mu$ CO6 $\mu$ CO5 $\mu$ CO6 $\mu$ CO6 $\mu$ CO6 $\mu$ CO6 $\mu$ CO6 $\mu$ CO7 $\mu$ CO7 $\mu$ CO9 $\mu$ CO								L1						
2.(a)	Explain the wo	orking of MO	S differenti	al pai	ir with	n prop	er dia	gram.			[05	] C	O2	L1	
. ,	Derive the exp the effect of ro		fferential ga	in of	f MOS	S diffe	erentia	l pair. A	Also ex	xplain	[05	] C	O2	L3	
3. Explain CMOS implementation of CS amplifier with circuit diagram and voltage transfer characteristics. [10]							] [	01	L1						
	INSTITUTE OF TECHNOLOGY USN														
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Date:	22/ 05/2018	Duration:		M	Iax Ma	arks.	50	Sem:	VI	Bran	ch:	Professional		al	
Butc.	22/ 03/2010	Duration.							V 1	Bran	]	Elect	ive		
			Answer	Any I	LIVEI	TULL	Questi	OHS					0	BE	
						Maı	rks	CO	RBT						
1. Consider a common-gate amplifier with active loads specified as follows: W/L= $7.2\mu m/0.36\mu m,~\mu_n C_{ox} = 387~\mu A/V^2,~r_0 = 18~k\Omega,~I_D = 100\mu A,~gm = 1.25m A/V,~\chi = 0.2,~R_S = 10~k\Omega,~R_L = 100~k\Omega,~C_{gs} = 20 fF,~C_{gd} = 5 fF~and~C_L = 0.$ Find $A_{vo},~R_{in},~R_{out},~G_v,~G_{is},~G_i~and~f_H.$						)]	CO1	L1							
2.(a) Explain the working of MOS differential pair with proper diagram.					[05	5]	CO2	L1							
(b) Derive the expression of differential gain of MOS differential pair. Also explain the effect of ro. [05]						5]	CO2	L3							
3. Explain CMOS implementation of CS amplifier with circuit diagram and voltage transfer characteristics.							[10	0]	CO1	L1					

4.	Explain the working of MOS differential pair with common-mode input and differential input.	[10]	CO1	L2
5.	For a MOS differential pair with common-mode voltage $V_{cm}$ applied, when $V_{DD}=V_{SS}=1.5v$ , kn'(W/L)=4mA/V², $V_t$ =0.5V, I=0.4mA, $R_D$ =2.5K $\Omega$ , $\lambda$ =0 calculate the following: a) $V_{OV}$ , $V_{GS}$ for each transistors b) $V_S$ , $I_{D1}$ , $I_{D2}$ , $V_{D1}$ , $V_{D2}$ when $V_{CM}$ =0 c) highest value of $V_{CM}$ for which $Q_1$ & $Q_2$ remains in saturation.	[10]	CO1	L3
6.a)	A MOS differential pair is operated at a total bias current of I=0.8mA using transistor with W/L=100, $\mu_n C_{OX}$ =0.2mA/V <sup>2</sup> , $V_A$ = 20V. Calculate $V_{OV}$ , gm, ro, $A_d$ .	[05]	CO2	L2
b)	Derive the expression of Rin, Rout and $A_{VO}$ of MOS Cascode amplifier with suitable diagram.	[05]	CO1	L1

4.	Explain the working of MOS differential pair with common-mode input and differential input.	[10]	CO1	L2
5.	For a MOS differential pair with common-mode voltage $V_{cm}$ applied, when $V_{DD} = V_{SS} = 1.5 v$ , kn'(W/L)=4mA/V², $V_t = 0.5 V$ , I=0.4mA, $R_D = 2.5 K \Omega$ , $\lambda = 0$ calculate the following: a) $V_{OV}$ , $V_{GS}$ for each transistors b) $V_S$ , $I_{D1}$ , $I_{D2}$ , $V_{D1}$ , $V_{D2}$ when $V_{CM} = 0$ c) highest value of $V_{CM}$ for which $Q_1$ & $Q_2$ remains in saturation.	[10]	CO1	L3
6a).	A MOS differential pair is operated at a total bias current of I=0.8mA using transistor with W/L=100, $\mu_n C_{OX}$ =0.2mA/V² , $V_A$ = 20V. Calculate Vov, gm, ro, $A_d$ .	[05]	CO2	L2
b).	Derive the expression of Rin, Rout and $A_{VO}$ of MOS Cascode amplifier with suitable diagram.	[05]	CO1	L1