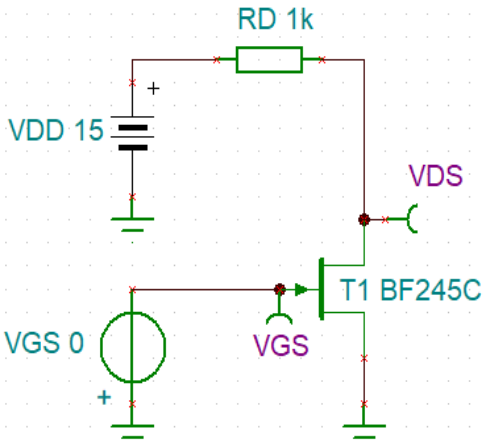


Fig.3.10a-Caracteristica de transfer

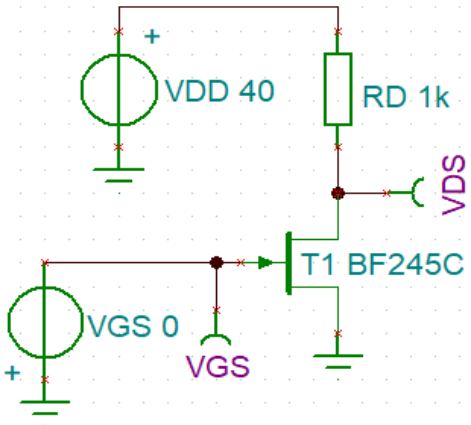


Fig.3.10b-Caracteristicile de ieşire

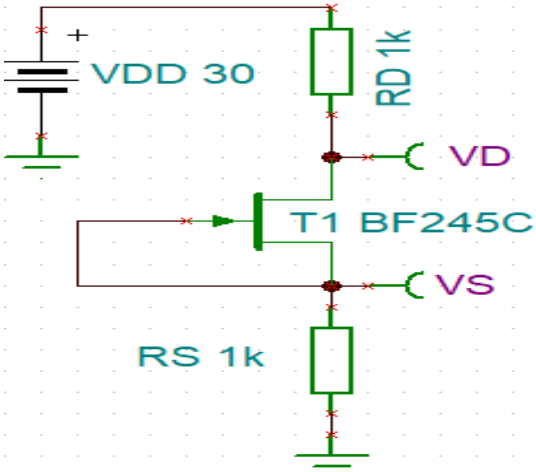


Fig.3.13 - TEC-J Generator de curent

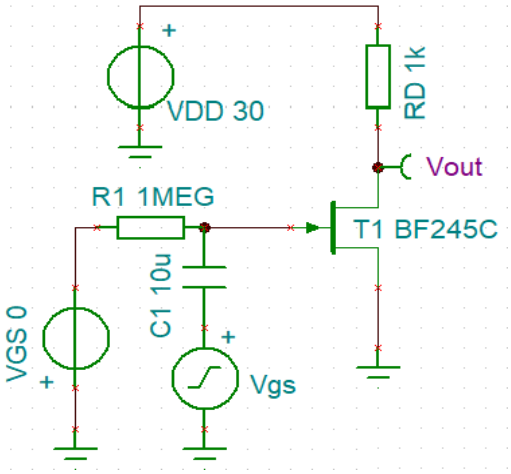


Fig.3.14 - Regimul dinamic

Cele patru figuri de mai sus reprezinta schemele realizate in programul de simulare TINA-TI pentru determinarile aferente tabelelor din fisa de rezultate.

Grupa: 424D **Numele: Găujăneanu Nicoleta Monica** **Semnătura**

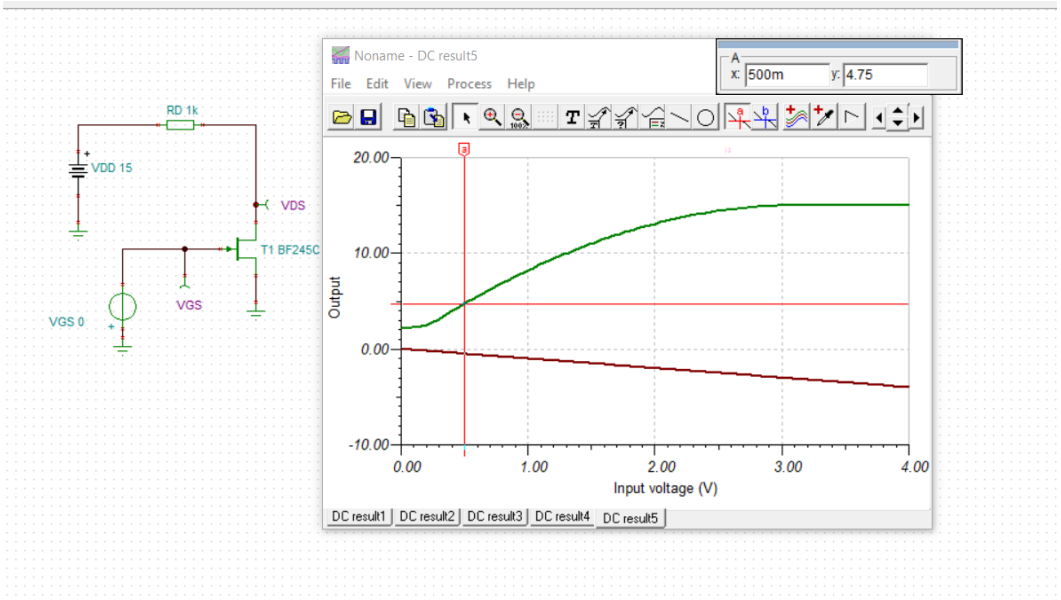
FIȘĂ REZULTATE LUCRARE L5 TEC-J_SOFT-HARD

1. Caracteristica de transfer

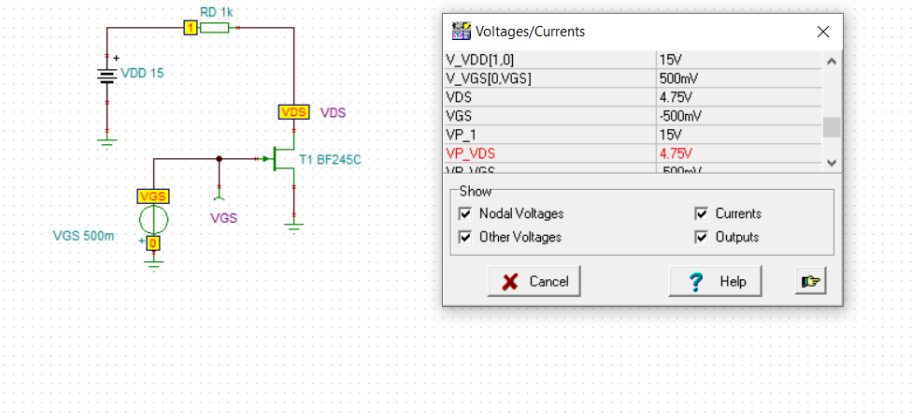
5p. Tabelul 3.1 (fig.3.10a)

V_{GS} [V]	0	-0,5	-1	-2	-2,2	-2,5	-2,7	-3	-3,01	-3,1
V_{DD} V	15	15	15	15	15	15	15	15	15	15
V_{DS} V	2.11	4.75	8.21	13.1	13.72	14.43	14.75	14.98	14.99	15
$R_D=R_{12}$ [KΩ]	1k	1k	1k	1k	1k	11k	11k	11k	11k	11k
I_D [mA]	12.89	10.25	6.79	1.9	1.28	0.57	0.25	0.02	0.01	0

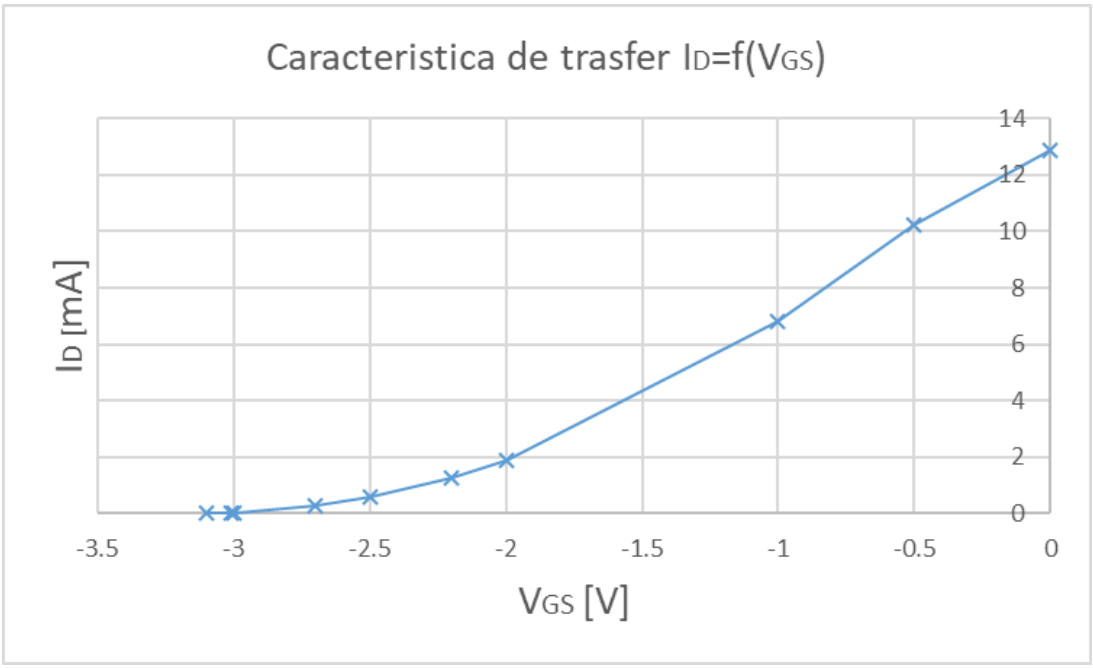
Curentul $I_D = (V_{DD} - V_{DS}) / R_D$



VDS

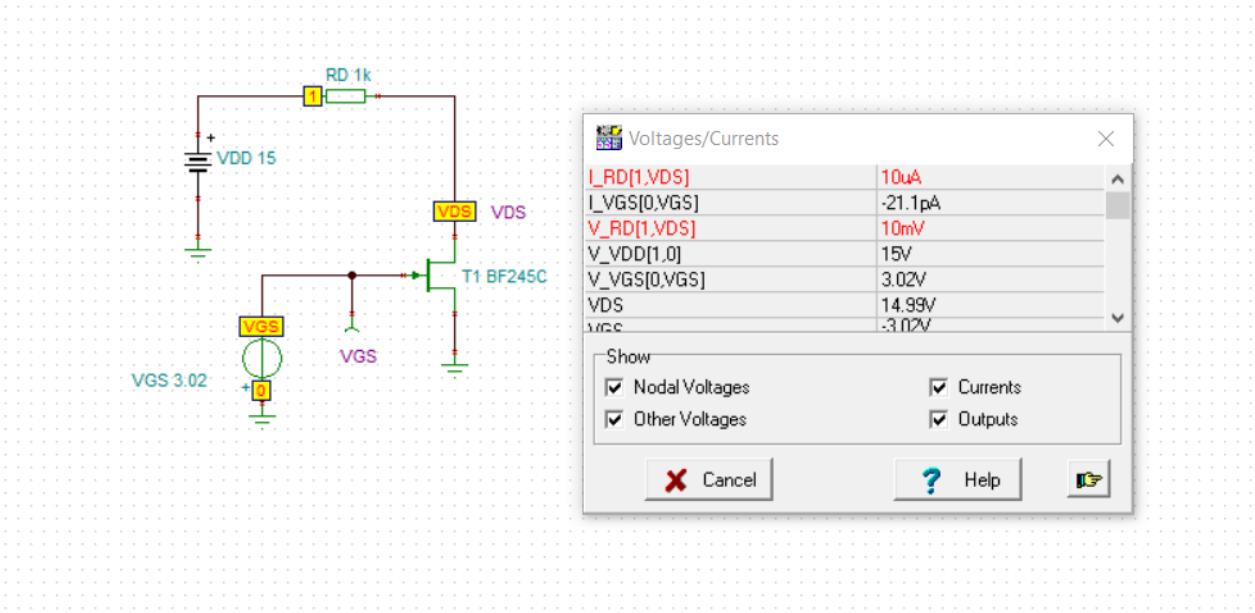


T1-2p. Inserați graficul caracteristicii de transfer $I_D=f(V_{GS})$ a tranzistorului TEC-J.



T2-1p. Determinați pe simulări tensiunea de prag la 10µA a tranzistorului TEC-J.

Tensiunea de prag la 10 µA este VGS = -3.0212 V.

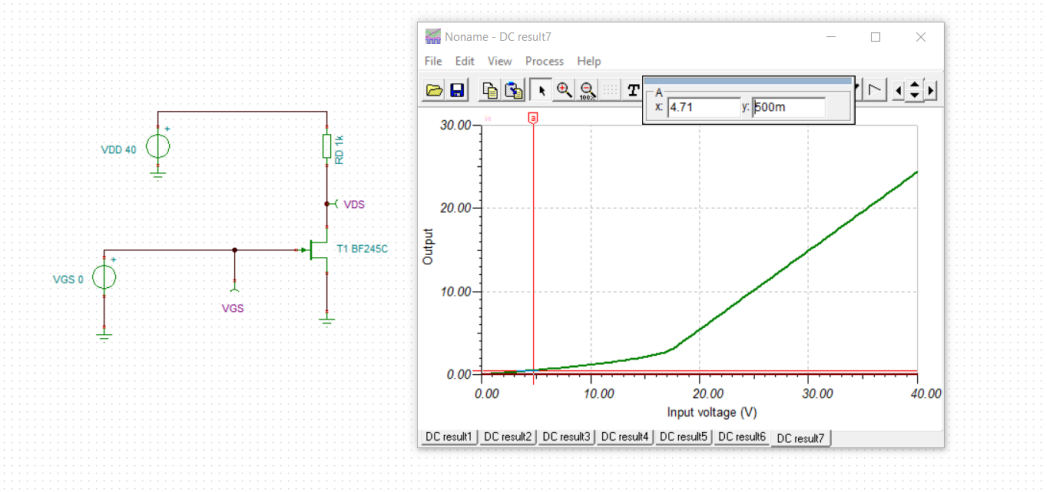


2. Caracteristica de ieşire

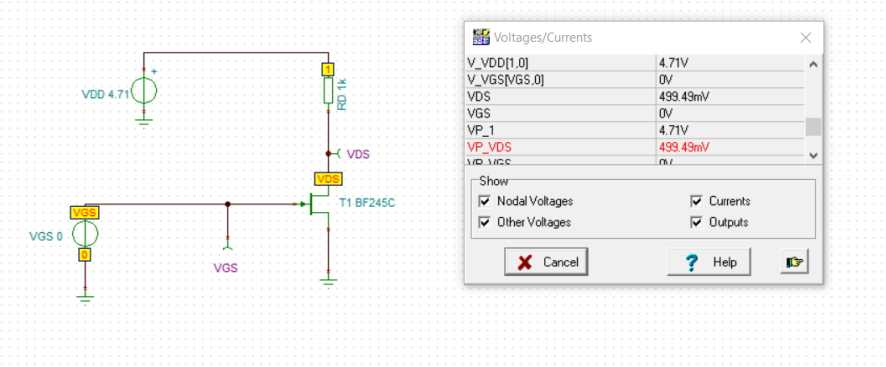
5p. Tabelul 3.2 (Fig.3.10b)

V_{DS} [V]		0	0.5	0.6	0.8	1	1.5	2	4
V_{GS}=0 [V]	$V_{DS,măs}$ [V]	0	0.5	0.6	0.8	1	1.5	2	4
	V_{DD} [V]	0	4,71	5.57	7.2	8.71	12	14.54	18.51
	$R_{12}+R_{J22}$ [KΩ]	1k	1k	1k	1k	1k	1k	1k	1k
	I_D= [mA]	0	4.21	4.97	6.4	7.71	10.5	12.54	14.51
V_{GS}=-0,5 [V]	$V_{DS,măs}$ [V]	0	0.5	0.6	0.8	1	1.5	2	4
	V_{DD} [V]	0	3.99	4.7	6.03	7.25	9.78	11.59	14.22
	$R_{12}+R_{J22}$ [KΩ]	1k	1k	1k	1k	1k	1k	1k	1k
	I_D= [mA]	0	3.49	4.1	5.23	6.25	8.28	9.59	10.22
V_{GS}=-1 [V]	$V_{DS,măs}$ [V]	0	0.5	0.6	0.8	1	1.5	2	4
	V_{DD} [V]	0	3.25	3.81	4.85	5.77	7.56	8.58	10.68
	$R_{12}+R_{J22}$ [KΩ]	1k	1k	1k	1k	1k	1k	1k	1k
	I_D= [mA]	0	2.75	3.21	4.05	4.77	6.06	6.58	6.68
V_{GS}=-2 [V]	$V_{DS,măs}$ [V]	0	0.5	0.6	0.8	1	1.5	2	4
	V_{DD} [V]	0	1.77	2.03	2.47	2.8	3.32	3.83	5.84
	$R_{12}+R_{J22}$ [KΩ]	1k	1k	1k	1k	1k	1k	1k	1k
	I_D= [mA]	0	1.27	1.43	1.67	1.8	1.82	1.83	1.54
V_{GS}=-2,2 [V]	$V_{DS,măs}$ [V]	0	0.5	0.6	0.8	1	1.5	2	4
	V_{DD} [V]	0	11.22	12.48	14.01	14.41	14.93	15.46	17.56
	$R_{12}+R_{J22}$ [KΩ]	11k	11k	11k	11k	11k	11k	11k	11k
	I_D= [mA]	0	0.974	1.08	1.2	1.219	1.22	1.223	1.232
V_{GS}=-2,5 [V]	$V_{DS,măs}$ [V]	0	0.5	0.6	0.8	1	1.5	2	4
	V_{DD} [V]	0	6.26	6.49	6.75	6.97	7.48	7.99	10.04
	$R_{12}+R_{J22}$ [KΩ]	11k	11k	11k	11k	11k	11k	11k	11k
	I_D= [mA]	0	0.523	0.535	0.54	0.542	0.543	0.544	0.549
V_{GS}=-3 [V]	$V_{DS,măs}$ [V]	0	0.5	0.6	0.8	1	1.5	2	4
	V_{DD} [V]	0	0.667	0.767	0.967	1.17	1.67	2.17	4.17
	$R_{12}+R_{J22}$ [KΩ]	11k	11k	11k	11k	11k	11k	11k	11k
	I_D= [mA]	0	0.015	0.015	0.015	0.0154	0.0154	0.0154	0.0154

$R_{12}+R_{J22}$ este **RD** din circuit**,** iar in tabel **$V_{DS,măs}$ = V_{DS};** $I_D = (V_{DD} - V_{DS}) / R_D$

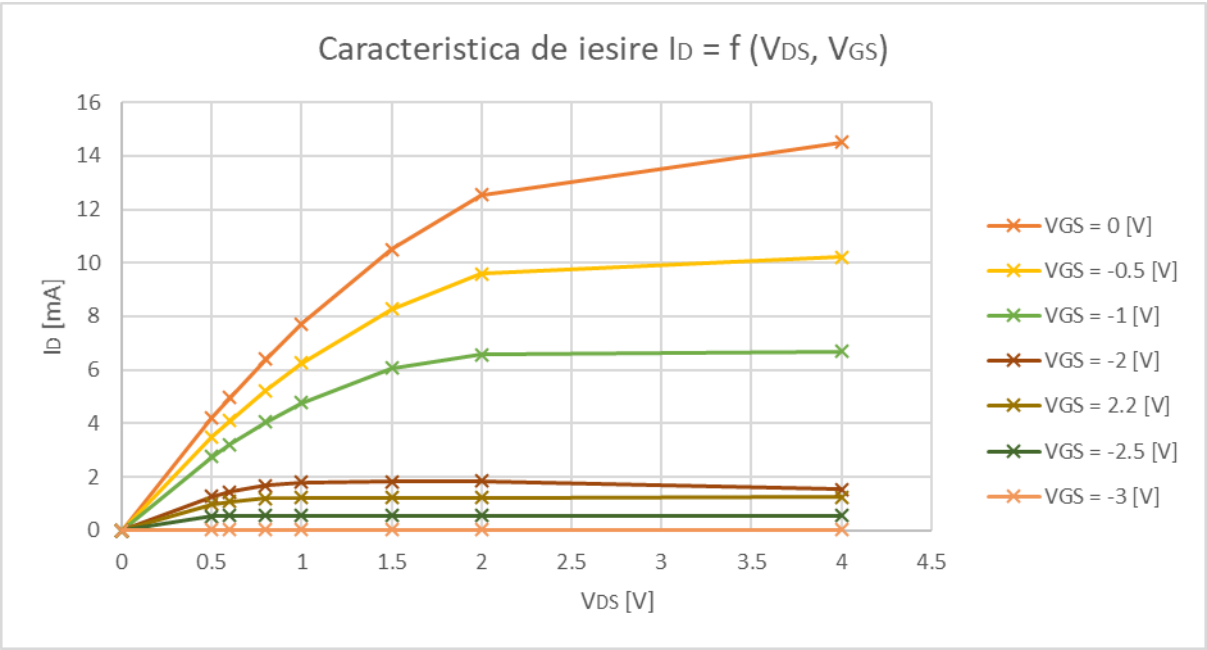


V_{DD}



$V_{DS,mas}$

T3-3p. Inserați graficul caracteristicii de ieșire $I_D = f(V_{DS}, V_{GS})$; V_{GS} - parametru.

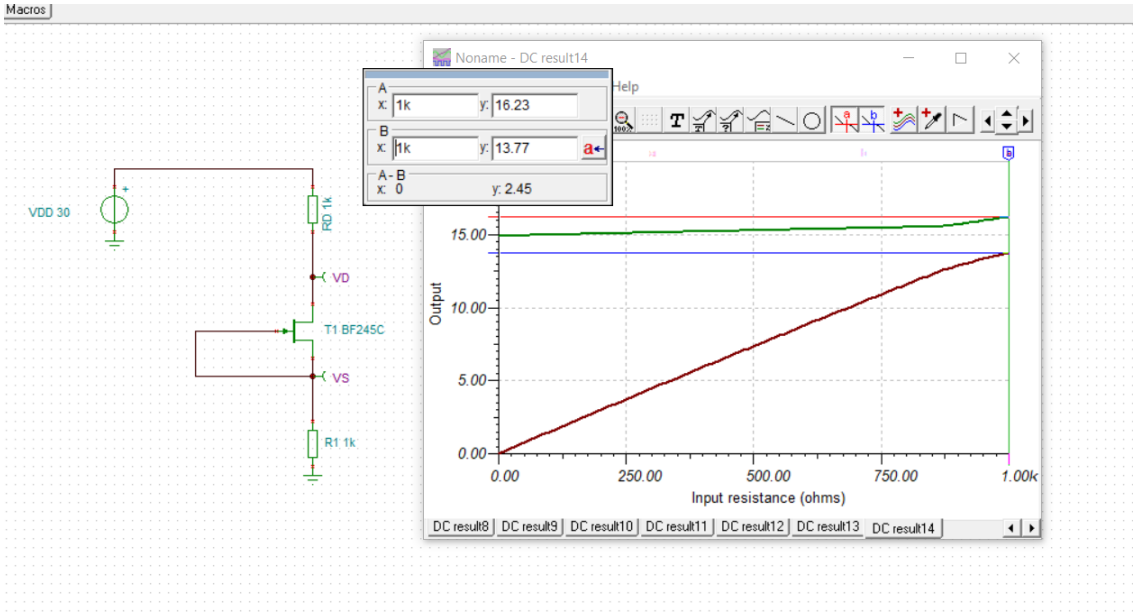


3. TEC-J ca generator de curent

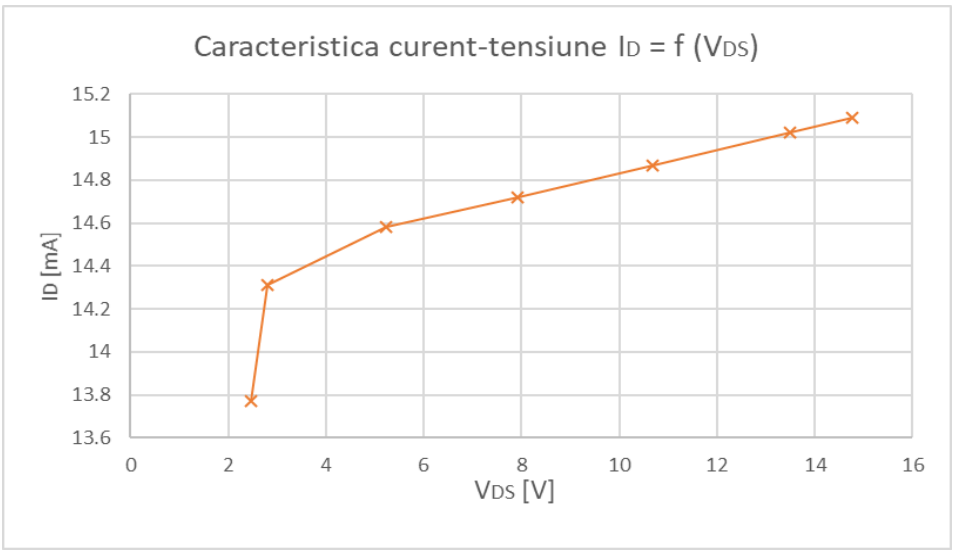
5p. Tabelul 3.4 (Fig.3.13)

R_S [Ω]	10	100	300	500	700	900	1k
V_D [V]	14,91	14,98	15.13	15.28	15.42	15.69	16.23
V_S [V]	0,151	1,5	4.46	7.36	10.2	12.88	13.77
V_{DD} [V]	30	30	30	30	30	30	30
V_{DS} [V]	14,76	13,48	10.67	7.92	5.22	2.81	2.46
V_{GS} [V]	0	0	0	0	0	0	0
I_D [mA]	15,09	15,02	14.87	14.72	14.58	14.31	13.77

$I_D = (V_{DD} – V_D) / R_D$ si $V_{DS} = V_D - V_S$



T4-2p. Inserați graficul variației lui I_D funcție de V_{DS} (***I_D = f(V_{DS})*** - caracteristica curent-tensiune).

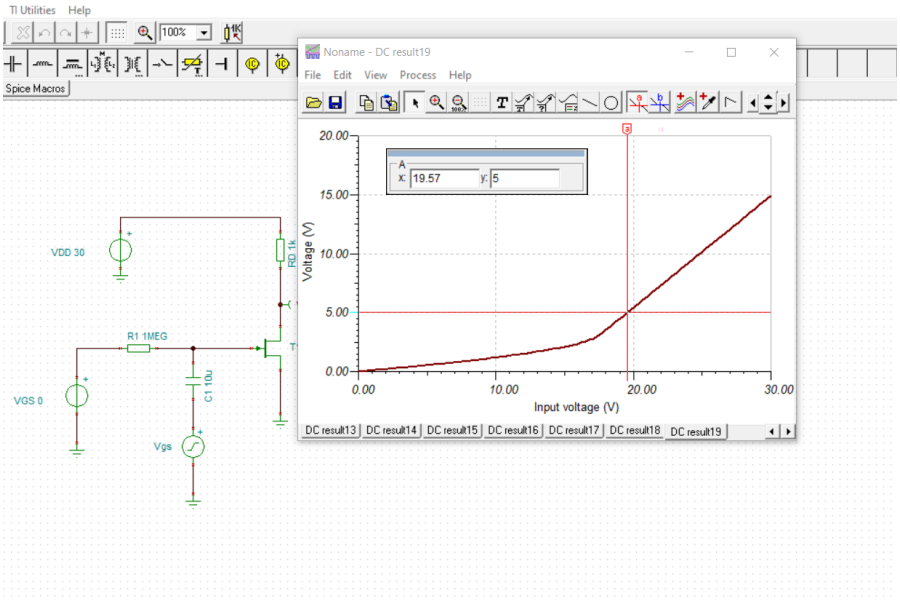


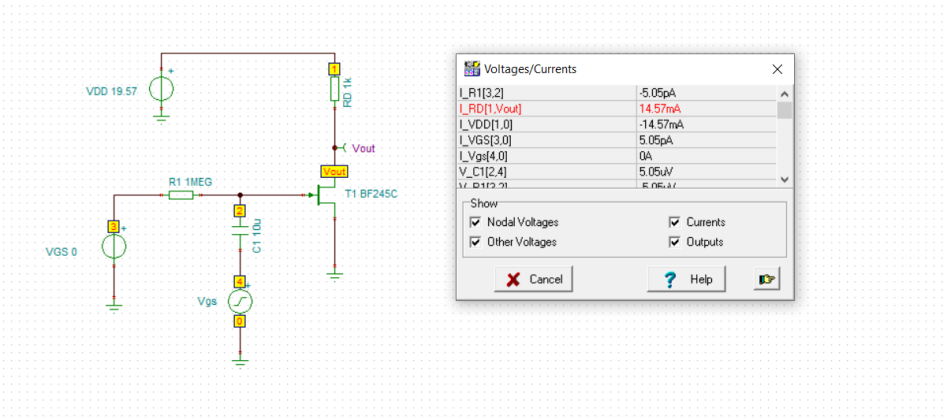
4.1 Măsurători in regim dinamic

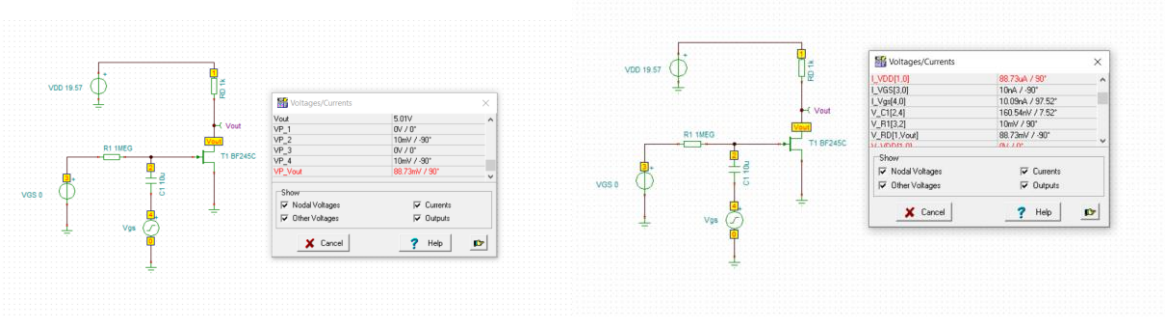
5p Tabelul 3.6 (Fig.3.14) condiția de cc: V_{DS} =5V (Vout in circuitul din figura)

V_{GS} [V]	0	-0.5	-1	-1,5	-2	-2.5
I_D [mA]	14.57	10.26	6.9	4.06	1,94	0.5794
V_{out} [mV]	88,73	76.89	63.86	49.78	34.83	19.24
V_{gs} [mV]	10	10	10	10	10	10
I_d [µA]	88,73	76.89	63.86	49.78	34.83	19.24
A_V	8.873	7.689	6.836	4.978	3.483	1.924
g_{ms} [mA/V]	-8.873	-7.689	-6.836	-4.978	-3.483	-1.924

$A_V = \frac{v_o}{v_i} = -g_{ms} \cdot R_D$ (in c.a. $v_o = V_{out}$ iar $v_i = V_{gs}$); *Vgs-semnal sinusoidal, A=10mV, f=1kHz*

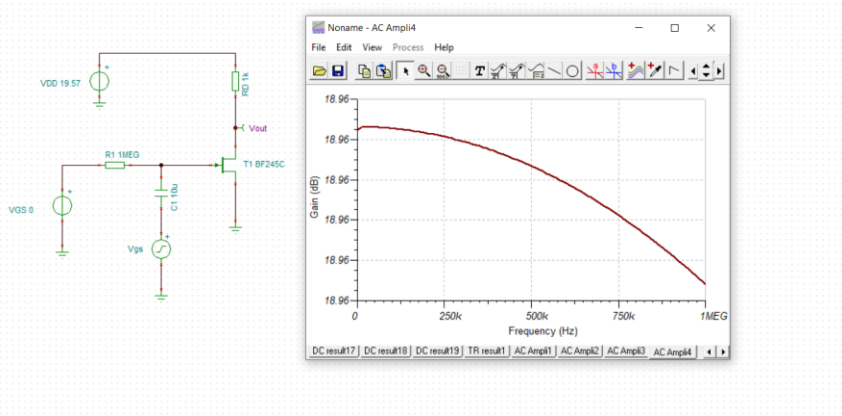


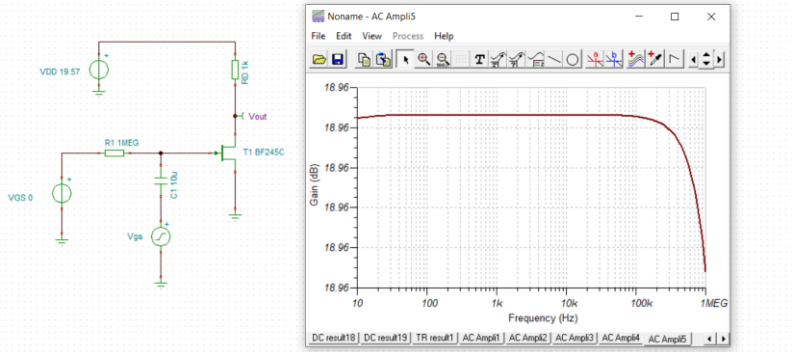




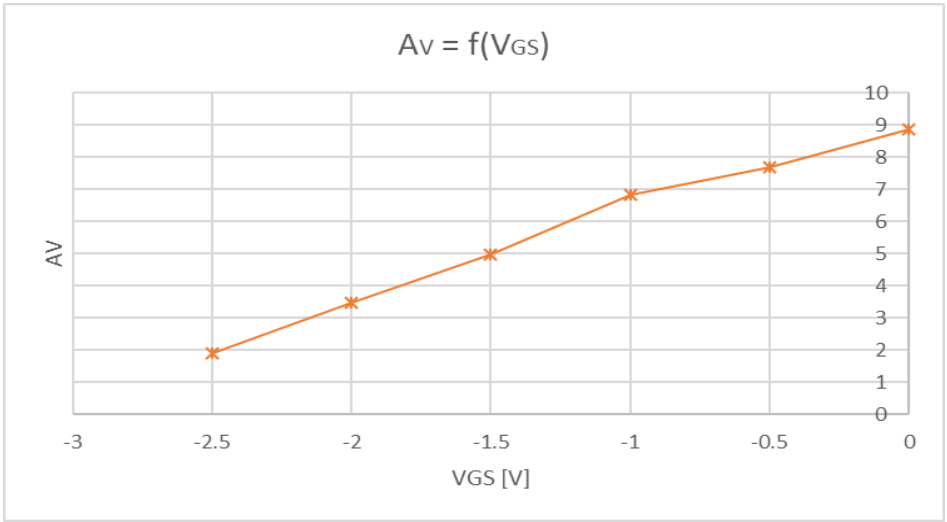
T5-2p. Inserați simularea amplificatorului sursă comună pentru o valoare V_{GS} aleasa din tabelul 3.6, Vgs=10mV și V_{DS}=5V și calculați amplificarea si g_{ms}, apoi inserați graficele: $A_V=f(V_{GS})$ si $A_V=f(I_D)$.

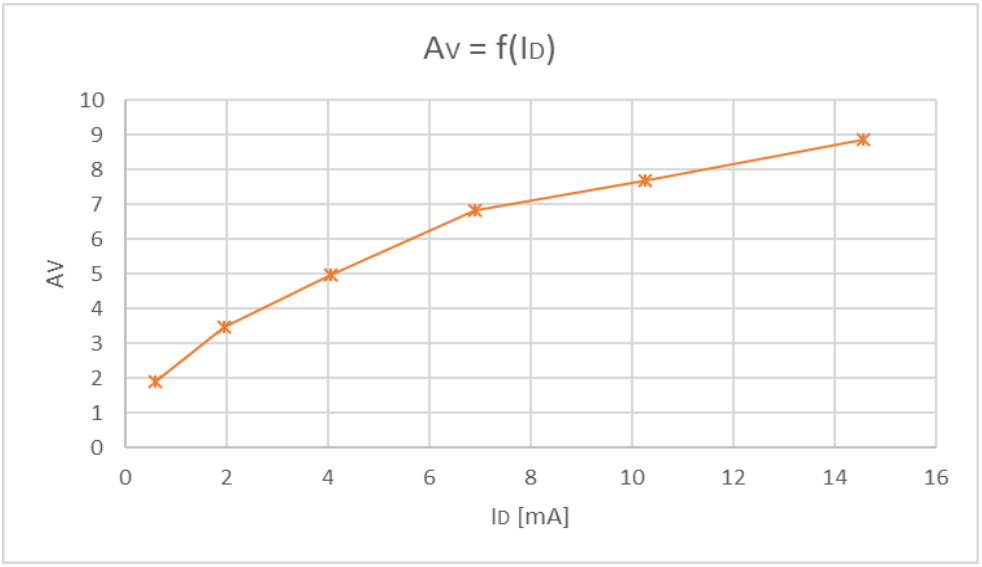
VGS = -0.5 V





A_v=7,69 g_m=-7,69 mA/V



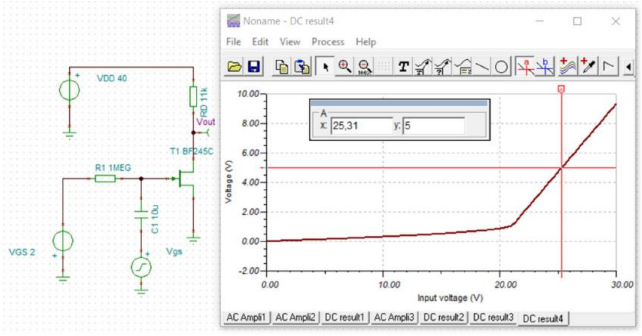


4.2 Măsurători rezistenta dinamica in saturație $r_{d,sat}$ (Atenție!! Cond. in cc: V_{DS} = Vout = 5V cu VGS = – 2V valoare fixa, pt ambele valori ale lui RD)

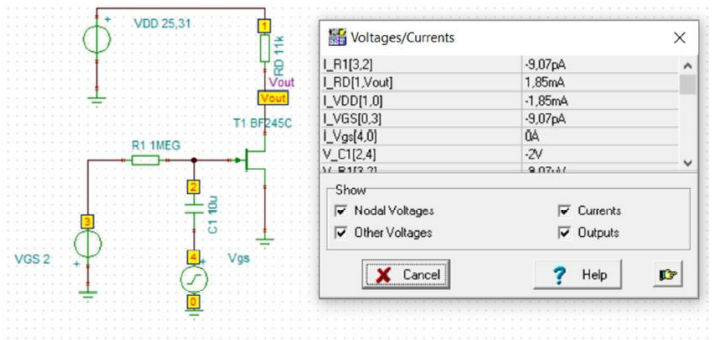
5p Tabel 3.5 (Fig.3.14)

RD	**11k**	**22k**
I_D [mA]	1.85	1.85
$V_{ds} = V_{out}$[mV]	342,61	640.26
V_{gs} [mV]	10	10
$r_{d,sat}$	156.69kΩ	

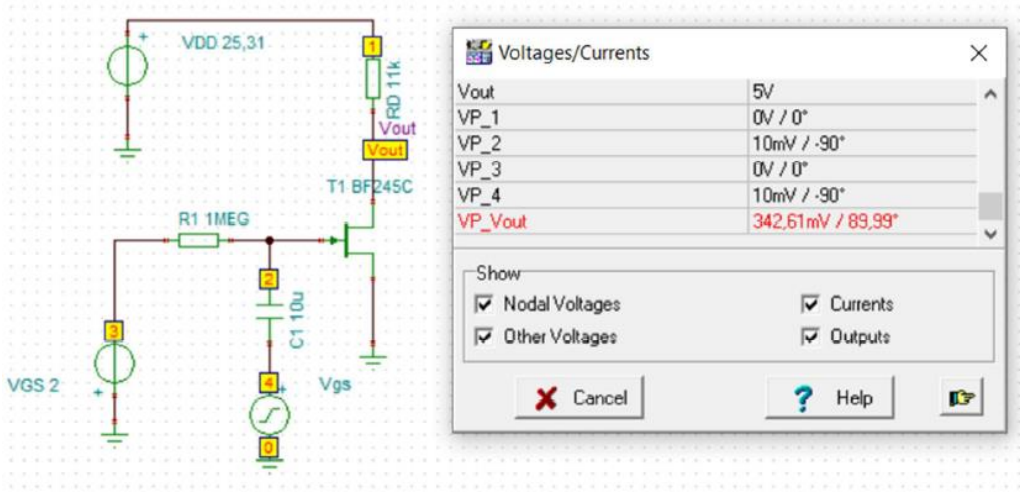
V_{DD}



I_D



V_{ds}



Se calculează apoi: $r_{d,sat} = \frac{1}{g_{d,sat}} = \frac{R_{D2} - R_{D1}}{\frac{R_{D2} \times v_{ds1}}{R_{D1} \times v_{ds2}} - 1}$