YILDIZ TECHNICAL UNIVERSITY

FACULTY OF ELECTRICAL AND ELECTRONICS ENGINEERING / DEPARTMENT OF BIOMEDICAL ENGINEERING

Name and surname:	**Student number:**			**Signature:**	
Course: BME2312 Analog Electronics	**Date / Time:** 23 June 2021 14:00			**Time:** 110 minutes	
Exam Type:	**Midterm1**	**Midterm2**	**Make-up** for Midterms	**Final** x	**Make-up**
Title Name-Surname: Assist. Prof**.** Dr. İsmail CANTÜRK **(Instructor)**					

1. (50p) Consider below single stage MOSFET amplifier circuit.

$(R_D = 10\ k\Omega, R_s = 30k\Omega, R_G = 100\ k\Omega, V_{tn} = 0.8V, k_n{}' = 85\mu A/V^2, W/L = 100,\ \lambda = 0)$

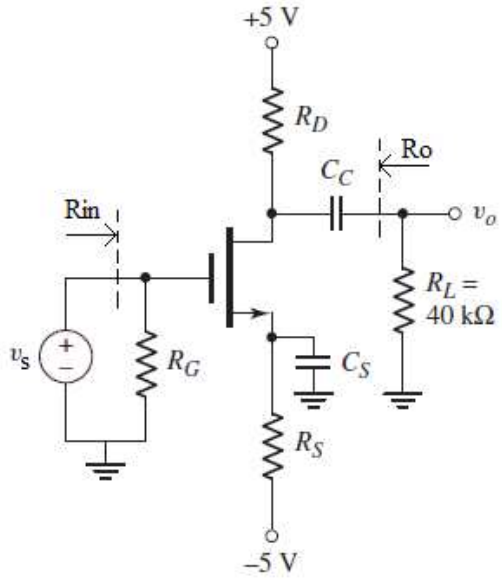
a) Determine operating point of the circuit. Verify your operation mode assumption.

b) Draw small signal equivalent circuit.

c) Calculate R_{in} .

d) Calculate R_o .

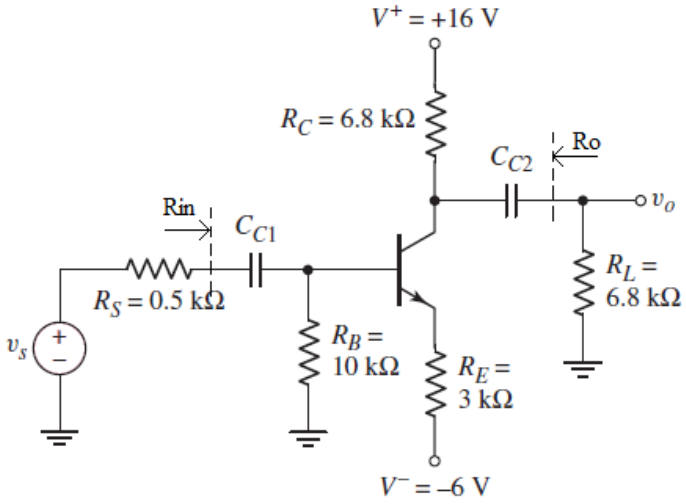
e) Determine small signal voltage gain v_o/v_s .



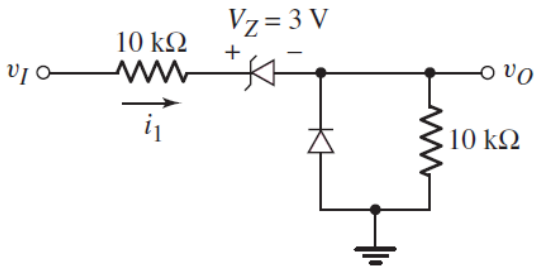
2. (30p) Consider below single stage BJT amplifier circuit.

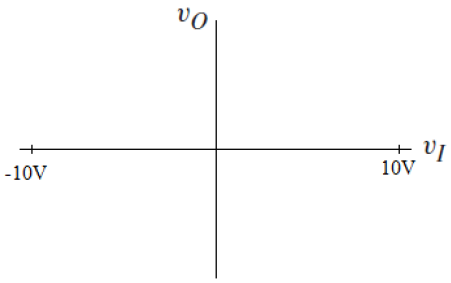
$(\beta = 100, V_A = \infty, V_T = 25mV, I_C = 1.7\ mA)$

a) Draw small signal equivalent circuit.
b) Calculate R_{in} .
c) Calculate R_o .
d) Determine small signal voltage gain v_o/v_s .



3. (20p) Consider below diode circuit and assume <u>ideal</u> diode model. Plot v_o versus v_I over the range $-10V < v_I < 10V$. Clearly indicate the points on the axes.





Note: Show your solution steps clearly and explain them. Also highlight your results (underline, encircle etc.). For amplifier questions, firstly derive expressions, then substitute numbers. Good luck.