編號： 210

國立成功大學 105 學年度碩士班招生考試試題

系　　所：電機資訊學院-資訊聯招

考試科目：應用電子學

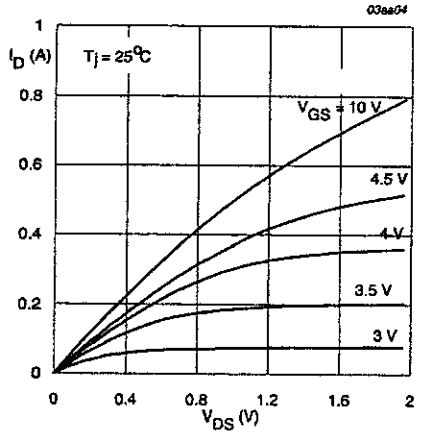
考試日期：0227，節次：2

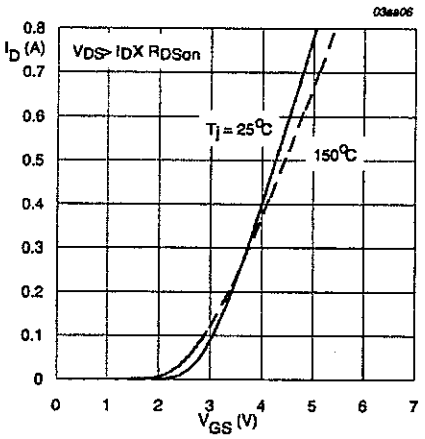
※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

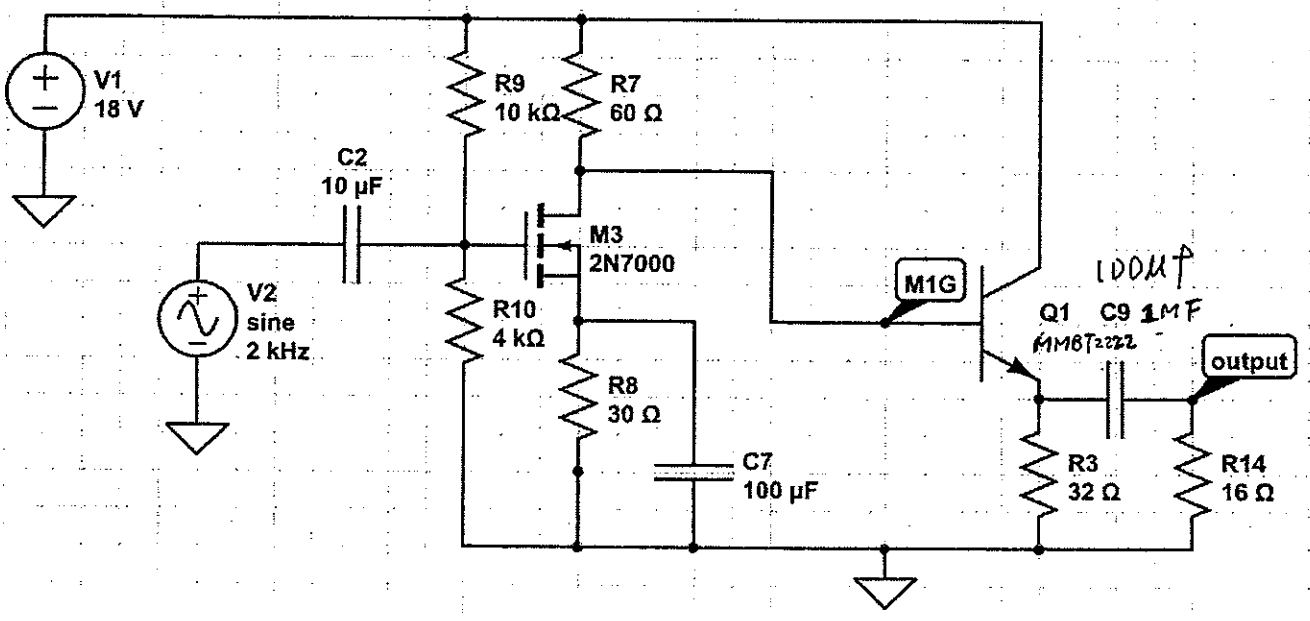
1. Given the following circuit. The necessary 2N7000 specifications are shown as follow. The BJT hfe is 100. (a) Draw the small signal model and the large signal model. (15%) (b) Find the **quiescent currents** of the two active devices and the voltage at point "M1G".(15%) (c) Given a 1KHz/0.5Volt sine wave as the input, find the amplitude at the point "Output". (10%) Show all details.

ON CHARACTERISTICS (Note 1)

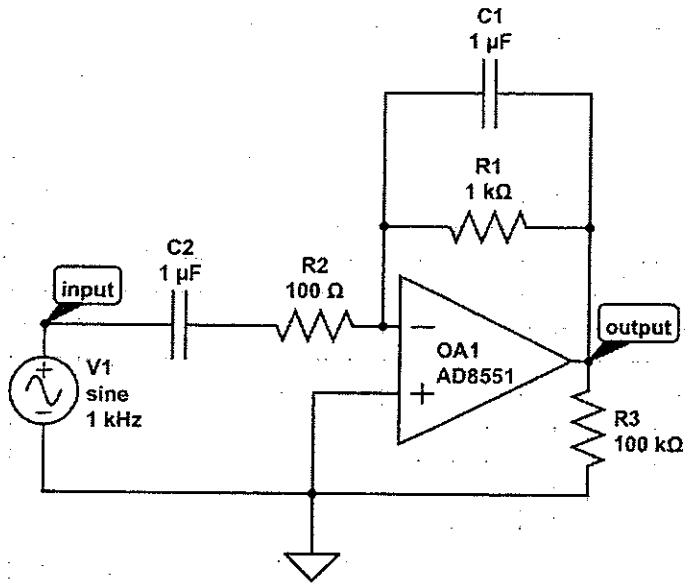
Gate Threshold Voltage	(V_{DS} = V_{GS}, I_D = 1.0 mAdc)	$V_{GS(th)}$	0.8	3.0	Vdc
Static Drain–Source On–Resistance	(V_{GS} = 10 Vdc, I_D = 0.5 Adc) (V_{GS} = 4.5 Vdc, I_D = 75 mAdc)	$r_{DS(on)}$	– –	5.0 6.0	Ω
Drain–Source On–Voltage	(V_{GS} = 10 Vdc, I_D = 0.5 Adc) (V_{GS} = 4.5 Vdc, I_D = 75 mAdc)	$V_{DS(on)}$	– –	2.5 0.45	Vdc
On–State Drain Current	(V_{GS} = 4.5 Vdc, V_{DS} = 10 Vdc)	$I_{d(on)}$	75	–	mAdc
Forward Transconductance	(V_{DS} = 10 Vdc, I_D = 200 mAdc)	g_{fs}	100	–	μmhos



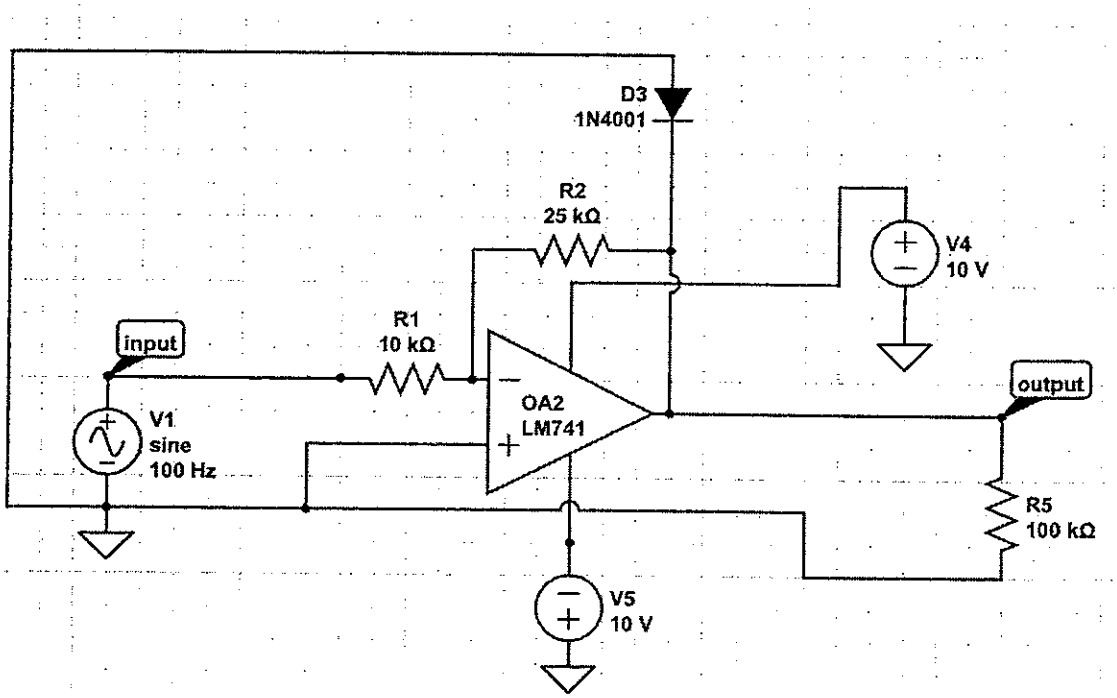




2. Given the following bandpass filter circuit. Give the magnitude frequency response in the range from 50Hz to 5KHz. (30%) Show all details.



3. Given the following two circuits. The breakdown voltages of D4 and D5 are 3.3V and 6.8V in the second circuit, respectively. The input is a 4Volt/1KHz sine wave for both circuits. Draw the output waveforms of the two circuits separately. Show all details in how to obtain your answers. (30%)



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