



UTM
UNIVERSITI TEKNOLOGI MALAYSIA

Sekolah Pendidikan Profesional dan
Pendidikan Berterusan
(UTMSPACE)

4
DOP B

**FINAL EXAMINATION / PEPERIKSAAN AKHIR
SEMESTER 1 – SESSION 2016 / 2017
PROGRAM KERJASAMA**

COURSE CODE : DDE 3223
KOD KURSUS

COURSE NAME : ELECTRONICS II /
NAMA KURSUS ELEKTRONIK II

YEAR / PROGRAMME : 3 / DDE / DDB
TAHUN / PROGRAM

DURATION : 2 HOURS 30 MINUTES / 2 JAM 30 MIMIT
TEMPOH

DATE : OCTOBER 2016
TARIKH

INSTRUCTION/ARAHAN :

1. Answer **ALL** questions in **part A**.
Jawab **SEMUA** soalan pada **bahagian A**.
2. Choose any three question from **part B**.
Pilih mana-mana tiga soalan dari **bahagian B**.

(You are required to write your name and your lecturer's name on your answer script)
(Pelajar dikehendaki tuliskan nama dan nama pensyarah pada skrip jawapan)

NAME / NAMA	:
I.C NO. / NO. K/PENGENALAN	:
YEAR / COURSE TAHUN / KURSUS	:
COLLEGE NAME NAMA KOLEJ	:
LECTURER'S NAME NAMA PENSYARAH	:

This examination paper consists of ...11... pages including the cover
Kertas soalan ini mengandungi11..... muka surat termasuk kulit hadapan

PART A (40 MARKS) / BAHAGIAN A (40 MARKAH)

- Q1. a) State 1 (one) advantage and 1(one) disadvantage of JFET as amplifier
Nyatakan 1 (satu) kelebihan dan 1 (satu) kekurangan JFET sebagai penguat.
- b) Design a self-bias bypassed JFET network to have a gain, $A_v = -8$. The device should be biased at $V_{GSQ} = |V_p|/3$. Given $V_{DD} = 20\text{ V}$, $R_G = 1\text{ M}\Omega$, $I_{DSS} = 12\text{ mA}$, $V_p = -6\text{ V}$ and $r_d = 40\text{ k}\Omega$. Draw and label the circuit.
Rekabentuk satu rangkaian JFET "bypassed" pincangan sendiri dengan gandaan, $A_v = -8$. Peranti mesti dipincang pada $V_{GSQ} = |V_p|/3$. Diberikan $V_{DD} = 20\text{ V}$, $R_G = 1\text{ M}\Omega$, $I_{DSS} = 12\text{ mA}$, $V_p = -6\text{ V}$ dan $r_d = 40\text{ k}\Omega$. Lukis dan labelkan litar.

(10 marks/markah)

Q2. Referring to Figure Q2,

- a) Show the appropriate connections to the inputs V_{i1} and V_{i2} for single-ended, double-ended and common mode operation.
b) Calculate I_E and I_C .

Merujuk pada Rajah Q2,

- a) *Tunjukkan penyambungan yang bersesuaian kemasukan V_{i1} dan V_{i2} bagi operasi 'single-ended', 'double-ended' dan mod sepunya.*
b) *Kirakan I_E dan I_C .*

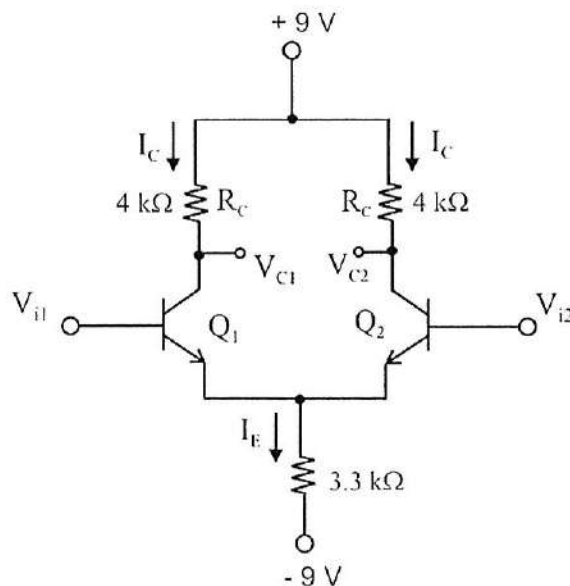
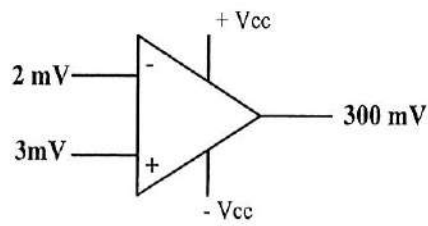


Figure Q2 / Rajah Q2

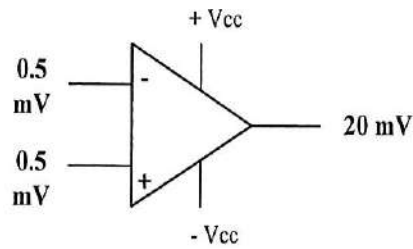
(10 marks/markah)

Q3. a) Draw and label the circuit model of a practical op-amp having $Z_i = 2\text{ M}\Omega$, $Z_o = 75\ \Omega$ and $A_v = 2 \times 10^5$.
Lukis dan labelkan model litar penguat kendali praktik yang mempunyai nilai $Z_i = 2\text{ M}\Omega$, $Z_o = 75\ \Omega$ dan $A_v = 2 \times 10^5$.

b) Calculate CMRR (in dB) for the circuit in Figure Q3(b).
Tentukan nilai voltan CMRR (dalam dB) untuk litar Rajah Q3(b).



Differential Mode



Common Mode

Figure Q3(b) /Rajah Q3(b)

(10 marks/ markah)

Q4. Referring to Figure Q4,

- State the class for this power amplifier circuit.
- Calculate maximum input power, $P_{i(dc)}$, maximum output power, $P_{o(ac)}$ and maximum efficiency, $\% \eta$.

Merujuk pada Rajah Q4,

- Nyatakan kelas bagi litar penguat kuasa ini.
- Kirakan kuasa masukan maksimum, $P_{i(dc)}$, kuasa keluaran maksimum, $P_{o(ac)}$ dan kecekapan maksimum, $\% \eta$.

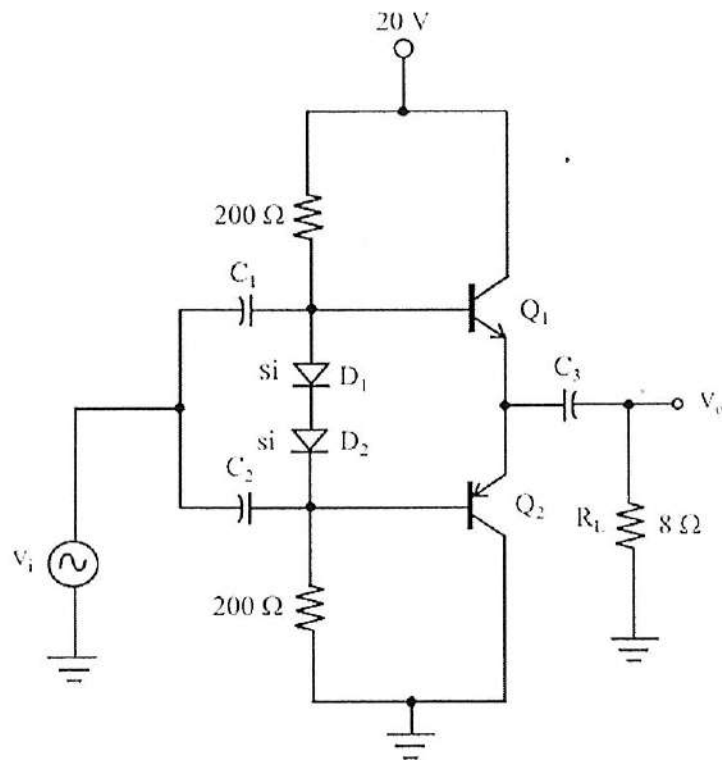


Figure Q4 / Rajah Q4

(10 marks/markah)

CHOOSE ANY THREE QUESTIONS IN PART B (60 MARKS) / PILIH MANA-MANA TIGA SOALAN DARI BAHAGIAN B (60 MARKAH)

- Q5. (a) Referring to the circuit in Figure Q5(a),
- Plot the transfer curve on the graph paper provided.
 - Given $I_{DQ} = 2.4 \text{ mA}$, $V_G = 1.82 \text{ V}$ and $V_D = 10.24 \text{ V}$, determine the values of R_{G2} , R_D and R_S .

Merujuk pada litar dalam Rajah Q5(a),

- Plot lengkung pindah di atas kertas graf yang disediakan.*
- Diberikan $I_{DQ} = 2.4 \text{ mA}$, $V_G = 1.82 \text{ V}$ dan $V_D = 10.24 \text{ V}$, tentukan nilai-nilai R_{G2} , R_D dan R_S .*

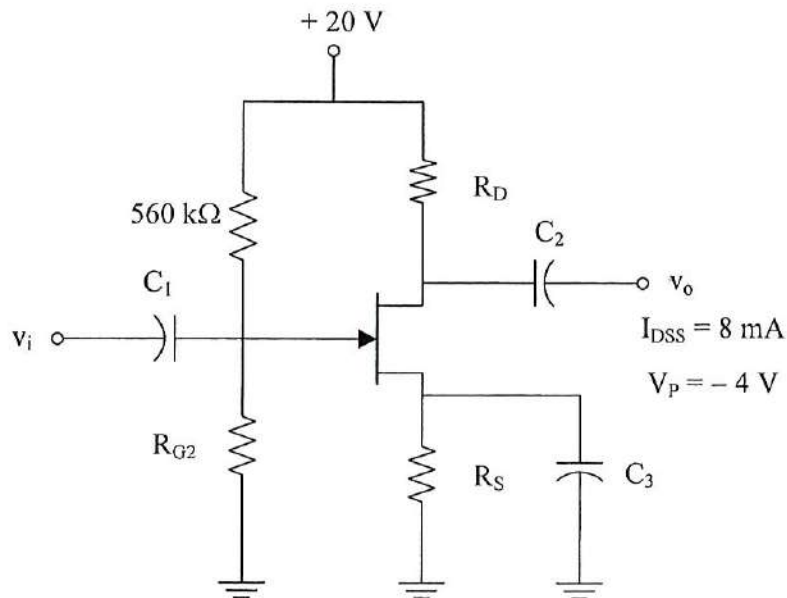


Figure Q5(a) / Rajah Q5(a)

(12 marks / markah)

- (b) i) Draw and label the ac equivalent circuit for the circuit in Figure Q5(b).
ii) Determine Z_i , Z_o and A_v .
iii) If the input voltage is $10 \text{ mV}_{\text{rms}}$ triangle wave, sketch the output voltage, v_o with reference to the input voltage, v_i
- i) Lukis dan labelkan litar setara au bagi litar dalam Rajah Q5(b).
ii) Tentukan Z_i , Z_o dan A_v .
iii) Jika voltan masukan ialah $10 \text{ mV}_{\text{rms}}$ gelombang segitiga, lakarkan voltan keluaran, v_o merujuk pada voltan masukan, v_i .

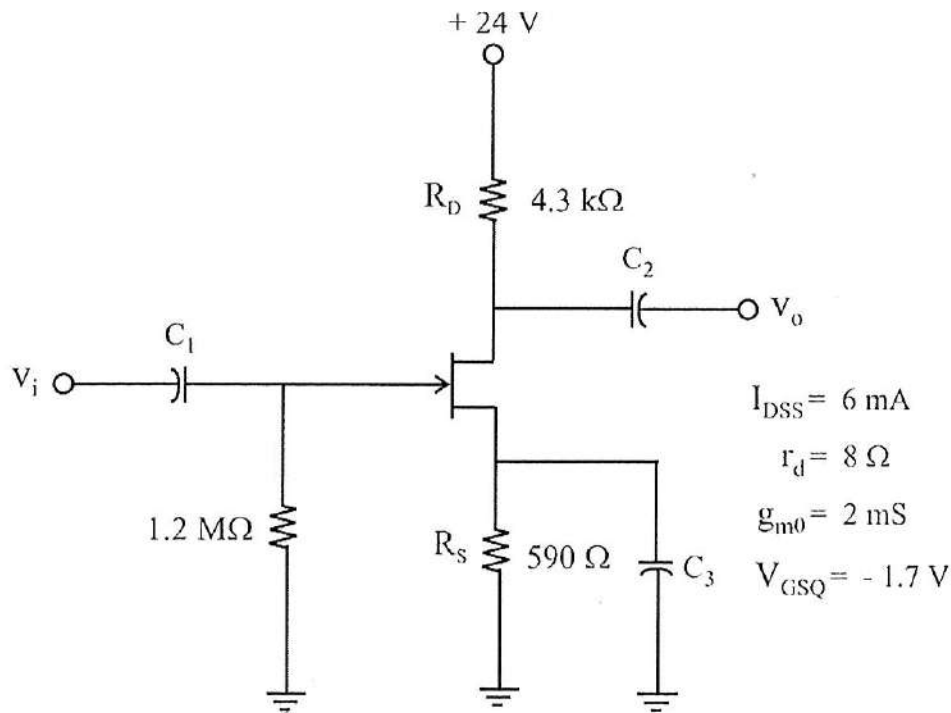


Figure Q5(b) / Rajah Q5(b)

(8 marks / markah)

Q6. Referring to Figure Q6,

- Sketch and label an ac equivalent circuit.
- Determine Z_i , Z_o , A_{V1} , A_{V2} , and A_{VT} .
- Draw output voltage, v_o referring to input, v_i .

Merujuk pada Rajah Q6,

- Lakar dan labelkan litar setara au.
- Tentukan Z_i , Z_o , A_{V1} , A_{V2} , dan A_{VT} .
- Lukiskan voltan keluaran v_o merujuk kepada voltan masukan, v_i .

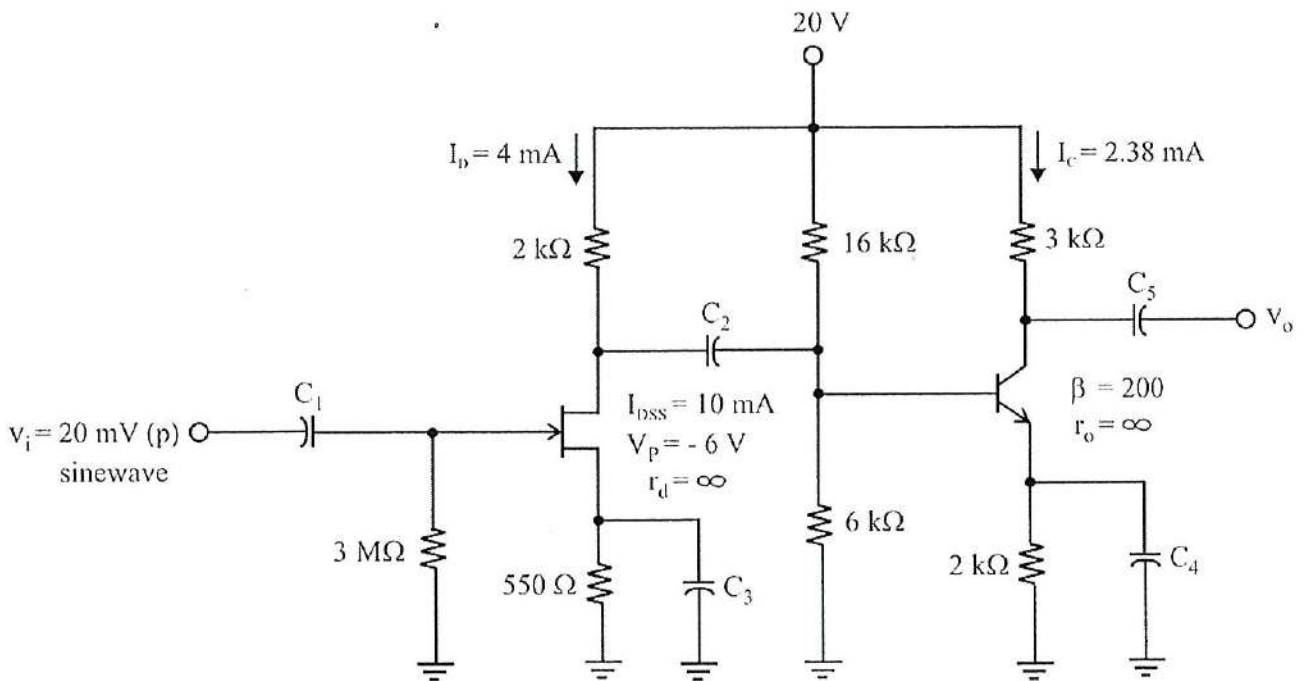


Figure Q6 / Rajah Q6

(20 marks/markah)

- Q7. a) Referring to Figure Q7(a),
- determine the output voltage, V_o in terms of V_1 and V_2 by using virtual earth concept.
 - sketch the output voltage, V_o , if $V_1 = 10 \text{ mV dc}$ and $V_2 = 20 \text{ mV}_{\text{rms}}$ sine wave.

Merujuk pada Rajah Q7(a),

- Tentukan voltan keluaran, V_o dalam sebutan V_1 dan V_2 menggunakan konsep bumi maya.
- Lakarkan voltan keluaran, V_o , jika $V_1 = 10 \text{ mV at}$ dan $V_2 = 20 \text{ mV}_{\text{pmka}}$ gelombang sinus.

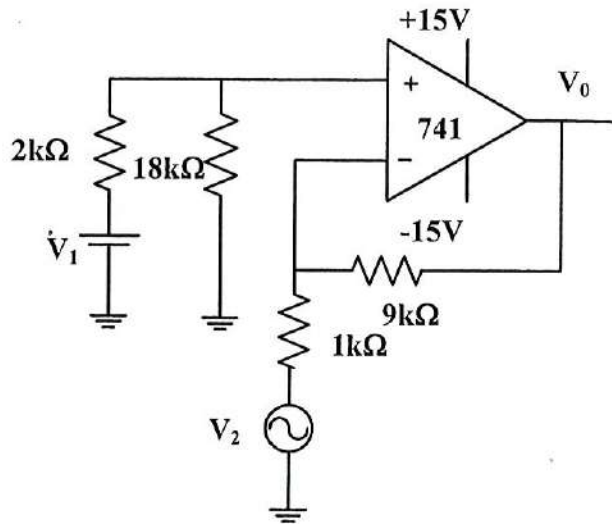


Figure Q7(a)/Rajah Q7(a)

(12 marks/markah)

- b) Referring to Figure Q7(b),
- State the application of the operational amplifier.
 - Sketch the output voltage, v_o referring to input, v_i .

Merujuk pada Rajah Q7(b),

- Nyatakan aplikasi penguat kendalian ini.
- Lakarkan voltan keluaran, v_o merujuk pada voltan masukan, v_i .

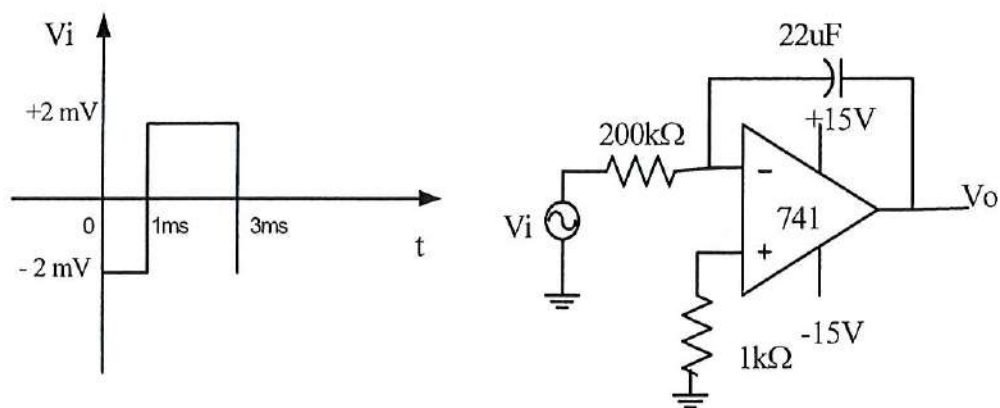


Figure Q7(b)/Rajah Q7(b)

(8 marks/markah)

Q8. Refer to Figure Q8,

- Determine V_{CEQ} and I_{CQ} .
- Sketch and label the dc and ac load line.
- Determine the maximum symmetrical output voltage and current swing.
- Determine the maximum efficiency.

Merujuk pada Rajah Q8,

- Tentukan V_{CEQ} dan I_{CQ} .
- Lakar dan labelkan garis beban at dan au.
- Tentukan voltan dan arus keluaran maksimum yang simetri.
- Tentukan kecekapan maksimum.

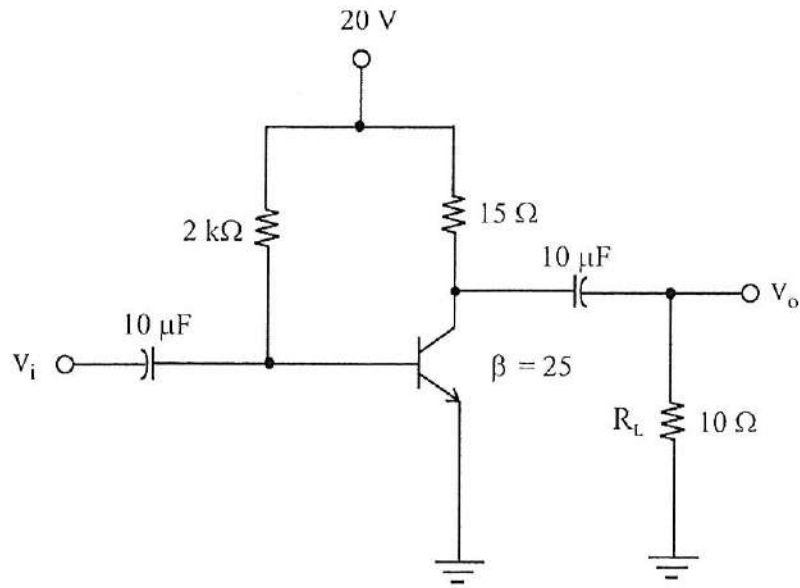


Figure Q8/ Rajah Q8

(20 marks/markah)