

國立臺北科技大學附設進修學院

九十七學年度電機工程系二技招生考試

電路學 (含電子學) 試題

第一部份：電路學

填 准 考 證 號 碼

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注意事項：

1. 本試題分為二部份，總分共計 200 分。
2. 本部份共【20】題，配分共【100】分。
3. 請按順序標明題號作答，不必抄題。
4. 全部答案均須答在答案卷內，否則不予計分。

1. If an ideal voltage source and an ideal current source are connected in parallel, what are the properties of the combination?
 - a. The same as a voltage source.
 - b. The same as a current source.
 - c. Different from either a voltage or a current source.
2. If an ideal voltage source and an ideal current source are connected in series, what are the properties of the combination?
 - a. The same as a voltage source.
 - b. The same as a current source.
 - c. Different from either a voltage or a current source.
3. When ideal arbitrary voltage sources are connected in parallel, which of the following is true?
 - a. The voltages add, independent of whether the individual sources are constant valued or have outputs that are functions of time.
 - b. The connection violates KVL; thus it is not permitted.
 - c. Neither is true.
4. In a network containing only independent current sources and resistors, the values of all resistors are doubled. What happens to the values of the node voltages?
 - a. They are doubled.
 - b. They stay the same.
 - c. They are halved.
 - d. They change in some other way.
5. A network consists only of independent current sources and resistors. If the values of all the current sources are doubled, what happens to the values of the node voltages?
 - a. They are doubled.
 - b. They stay the same.
 - c. They are halved.
 - d. They change in some other way.
6. Is it possible to make a Norton equivalent circuit of an ideal voltage source?
 - a. Yes.
 - b. No.

7. If a ramp of voltage is applied to the terminals of a capacitor, what is the waveform of the input current to the capacitor?
 - a. A constant
 - b. A ramp.
 - c. A parabolic curve (proportional to t^2).
8. The expression for the instantaneous power supplied to a capacitor is

$$p(t) = C v(t) \frac{dv}{dt}$$
9. If a ramp of voltage is applied to a capacitor, what is the waveform of the power?
 - a. A constant
 - b. A ramp.
 - c. A parabolic curve (proportional to t^2).
 - d. Something else.
9. A ramp of voltage is applied to a capacitor. If the slope of this ramp is doubled, what happens to the slope of the ramp in the waveform of power?
 - a. It is halved.
 - b. It stays the same.
 - c. It is doubled.
 - d. It changes in some other way.
10. The total energy supplied to a capacitor is

$$w(t) = C \frac{v^2(t)}{2}$$
- If the total charge stored in a capacitor is doubled, what happens to the energy stored in the capacitor?
 - a. It is halved.
 - b. It is doubled.
 - c. It changes in some other way.
11. A first-order circuit with a single resistor has a time constant of unity. If the resistor is doubled in value, the time constant is halved. Is this an RC or an RL circuit?
 - a. RC.
 - b. RL.
12. A first order circuit with a single resistor has a time constant of unity. If the resistor is doubled in value, the time constant is also doubled. Is this an RC or an RL circuit?
 - a. RC.
 - b. RL.
13. In a circuit consisting of a single resistor, capacitor and inductor, will setting the value of the resistor to zero produce an un-damped sinusoidal zero-input response?
 - a. Yes.
 - b. No.
14. Which of the following classes of second-order circuits can have an un-damped sinusoidal response? (Note: "RC" means a circuit comprised only of resistors and capacitors, etc.)
 - a. RC
 - b. RL.
 - c. RLC.
 - d. LC.
15. A circuit consists of a single resistor, capacitor and inductor has an un-damped sinusoidal response. If the value of the inductor is increased, what happens to the frequency of such a response?
 - a. It decreases.
 - b. It increases.
 - c. It may decrease or increase depending on the circuit configuration.
 - d. It does not change.
16. In the magnitude plot of a low-pass filter, at what frequency does the peak of the magnitude characteristics occur?
 - a. At the resonant frequency.

注意：背面尚有試題

- b. Below the resonant frequency;
 - c. Above the resonant frequency.
17. In a circuit that contains only resistors and inductors, which of the following describes the power factor for the circuit?
- a. Leading
 - b. Lagging
 - c. Could be either.
18. If the phase angle of a driving-point admittance is positive, which of the following describes the power factor for the circuit?
- a. Leading
 - b. Lagging
 - c. Could be either.
19. For a circuit consisting of a parallel connection of resistor, a capacitor and a current source in which the value of the resistance is a function of time, can the differential equation be Laplace transformed?
- a. Yes.
 - b. No.
20. Is the Laplace transform of the product of two time-domain functions equal to the product of the individual Laplace transforms of the two functions?
- a. Yes.
 - b. No.

僅供參考

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電路學（含電子學）試題

第二部份：電子學

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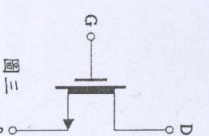
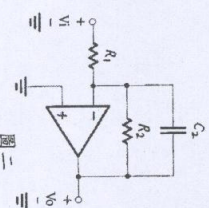
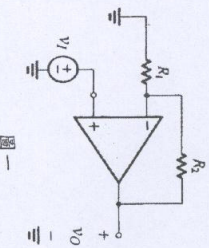
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21. 二極體順向偏壓時會
(A) 阻止電流 (B) 導通電流 (C) 有高阻抗 (D) 高電壓降
22. 假使輸入 60 Hz 的信號給全波整流器，請問其整流輸出信號的頻率是
(A) 120 Hz (B) 60 Hz (C) 30 Hz (D) 0 Hz
23. 如果橋式全波整流電路有一個二極體斷路，則輸出電壓會是
(A) 0 V (B) 沒有影響 (C) 變成半波整流 (D) 大小變成原來的四分之一
24. 用歐姆錶的正端接二極體的陽極，而負端接二極體的陰極，則二極體為
(A) 逆向偏壓 (B) 開路 (C) 短路 (D) 順向偏壓
25. 假設半波整流器的輸入電壓 $V_{rms} = 10\text{ V}$ ，則二極體要能忍受的逆向電壓約為
(A) 10 V (B) 13.44 V (C) 14.14 V (D) 20 V
26. 當 BJT 電晶體以截止和飽和兩種模式工作時，就像是一只
(A) 線性放大器 (B) 電子開關 (C) 可變電容 (D) 可變電阻
27. 某放大器在輸入信號 100 mV 時，會有 10 V 輸出信號，其電壓增益為
(A) 10 (B) 20 (C) 100 (D) 200
28. 上題的電壓增益若以 dB 表示，則為
(A) 10 (B) 20 (C) 40 (D) 100
29. 已知某共射極放大器電壓增益為 50，若移除射極電阻的旁路電容，則
(A) 電路將變得不穩定 (B) 會减小電壓增益 (C) 會增加電壓增益 (D) 工作點會偏移

30. 已知室溫下某電晶體放大器的直流射極電流為 2 mA，則其交流射極阻抗 r_e 大小約為
(A) 13 Ω (B) 30 Ω (C) 80 Ω (D) 100 Ω
31. 某非反向放大器如圖一， $R_1 = 1\text{ k}\Omega$ ， $R_2 = 100\text{ k}\Omega$ ，則電壓增益 v_o/v_i 為
(A) -100 (B) 100 (C) 101 (D) 102
32. 組裝一具儀表放大器需要運算放大器
(A) 一個 (B) 兩個 (C) 三個 (D) 四個
33. 圖二電路的功能應為
(A) 微分器 (B) 積分器 (C) 比較器 (D) 加法器
34. 圖二電路的頻率響應類似
(A) 高通 (B) 低通 (C) 全通 (D) 帶通
35. 圖二電路的 3dB 頻率為
(A) $1/[(R_1+R_2)C_2]$ (B) $1/(R_1//R_2)C_1$ (C) $1/(R_1C_2)$ (D) $1/(R_2C_2)$
36. 欲使振盪器能開始振盪，則閉環路增益必須
(A) 等於 0.5 (B) 小於 1 (C) 等於 1 (D) 大於 1
37. 開流穩壓
(A) 只有兩個端點 (B) 兩層 PN 接面 (C) 三層 PN 接面 (D) 四層 PN 接面
38. 當放大器的頻率由 1 kHz 下降到 10 Hz 時，增益降了 6 dB，則下降率為
(A) -3 dB/10 倍 (B) -6 dB/10 倍 (C) -3 dB/2 倍 (D) -6 dB/2 倍
39. MOSFET 是一種
(A) 電壓控制單載子元件 (B) 電流控制單載子元件 (C) 電壓控制雙載子元件 (D) 電流控制雙載子元件
40. 圖三中的 MOSFET 符號為
(A) N 通道空乏型 (B) P 通道空乏型 (C) N 通道增強型 (D) P 通道增強型



圖一 圖二 圖三

電路中運算放大器均假設為理想