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# 國立高雄大學九十四學年度產學研發碩士專班招生考試試題

系所(組別)：電機工程學系產學研發碩士專班　　科目：電子學

考試時間：100 分鐘　　本科原始成績滿分 100 分

1. For the circuit shown in Fig. 1. Assume ideal op amp. ( 20%)
   (a) $Z_1$=R, $Z_2$=C, $v_1$=v, $v_2$=0, please find the voltage gain and input resistance.
   (b) Please design an OP Amp differentiator using $Z_1$=3R, $Z_2$=6R, $Z_3$=5R, $Z_4$=10R, $v_1$ , $v_2 \neq 0$ and find this output voltage.
2. (a) Please design OR (A+B+C) and AND (ABC) diode logic gates using ideal diode. (10%)
   (b) Design a limiter circuit using some diodes and 10kΩ resistor to provide an output signal limited to the range from +1.4V ~ -1.4V. Assume only two diodes with 0.7 drop when conducting, in respectively. (10%)
3. For the circuit in Fig. 3 (20%)
   (a) If $R_e$=0, consider early effect, Let I=1mA, $R_C$=5kΩ, $\beta$=100, $V_A$=100V, and $R_S$=5kΩ, please find the $R_i$, $A_V$, $A_i$, $R_o$. (10%)
   (b) If $R_e$=175kΩ, neglect early effect, Let I=1mA, $R_C$=5kΩ, $\beta$=100, and $R_S$=5kΩ, please find the $R_i$, $A_V$, $A_i$, $R_o$. (10%)
4. (a) Please describe these nouns: enhancement mode nMOSFET, depletion mode nMOSFET, cut-off region, triode region and saturation region. (10%)
   (b) For the circuit in Fig. 4, $V_{DD}$=10V, $V_T$=2V, k(W/L)=1mA/$V^2$, $V_{GS}$=4V, and $R_D$=3.6kΩ. (10%)
   Please find $I_D$, $V_D$, $g_m$, $A_v$ and $r_o$. (10%)
5. (a) Please classification four feedback configurations? (10%)
   (b) For the circuit in Fig 5, $V_t$=2V, $k_nW/L$= 0.5mA/$V^2$, $R_1$=10kΩ, $R_2$=10MΩ, $R_L$=6kΩ, Please find the voltage gain, $R_{in}$, and $R_{out}$. (10%)

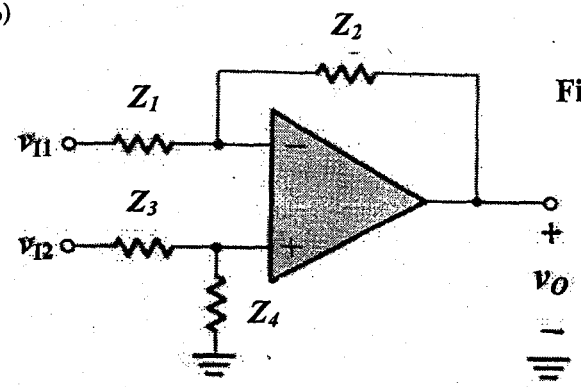


Fig. 1

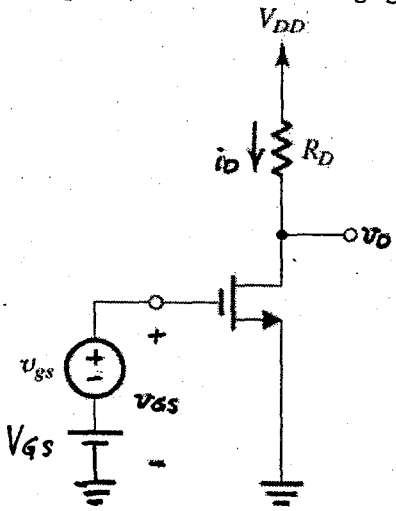


Fig 4

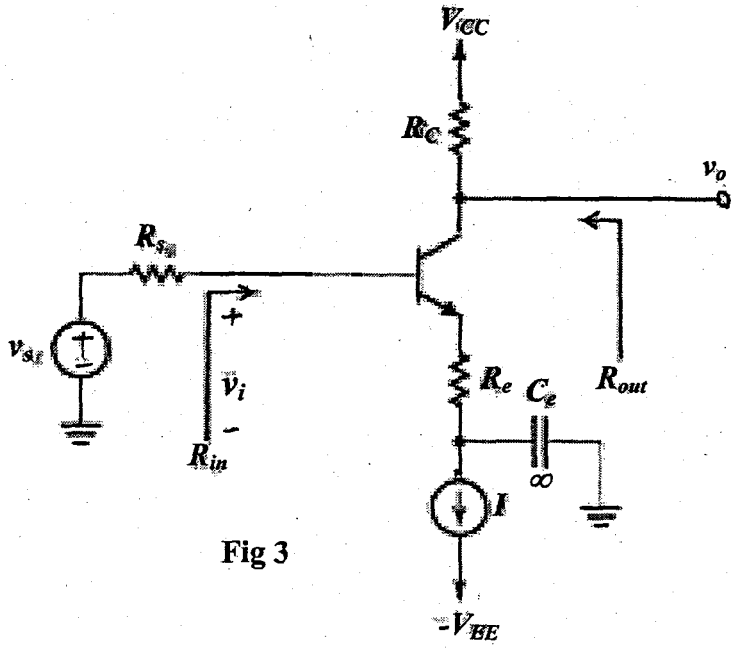


Fig 3

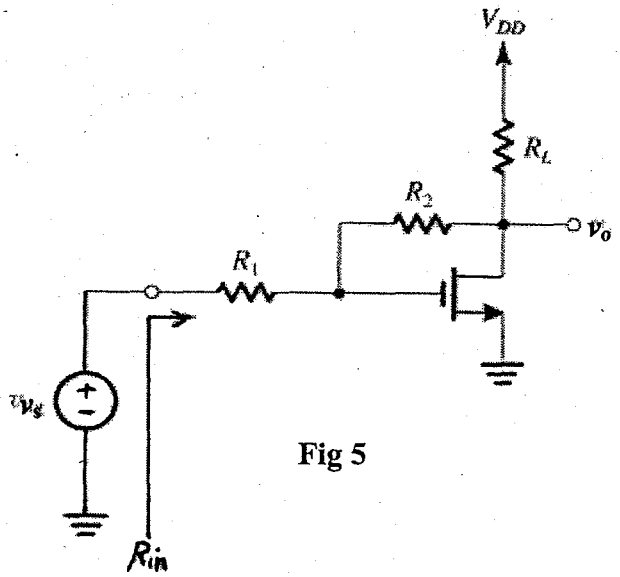


Fig 5

# 國立高雄大學九十四學年度產業研發碩專班招生考試試題

系所(組別)：先進電子構裝技術產業研發碩士專班　科目：　英文

考試時間：100 分鐘　　本科原始成績滿分 100 分

## I. Multiple-Choice: Gap-fill (30%)

1. Grownups love figures. When you tell them that you have made a new friend, they never say to you, "_1._ does he look? What games does he love most?" _2._ they demand, "How old is he? How much money does his father make?" Only from these figures _3._ they have learnt anything about him. If you were to say to the grownups, "I saw a beautiful house _4._ rosy bricks, with tulips in the windows and doves on the roof," they _5._ not be able to get any idea of that house at all. You would have to say to them, "I saw a house that cost 20 million." Then they would exclaim, "Oh, what a pretty house it is!"
   1. (A) what (B) where (C) how (D) when
   2. (A) Furthermore (B) In addition (C) Instead (D) On the other hand
   3. (A) they think (B) do they think (C) are they think (D) as they think
   4. (A) made of (B) made into (C) turn up (D) turn off
   5. (A) would (B) can (C) will (D) may

2. Below is a common form of payment in the United Kingdom. This payment method is called _6._ Now you need to pay £42.50 to Francis Anderson. Please complete the missing information.

**NatWest Bank**

8 60-23-45

Date: 7._____

Birmingham Attwood House Branch

Attwood House, 1 Worcester Walk, Birmingham B2 4NX

Pay 8._____

9._____ 10. £_____

Mr C CANNING

11._____

   6. (A) cash (B) cheque (C) money order (D) credit card
   7. (A) 11 October '04 (B) 04 11 10 (C) 2004 October 11 (D) None of above
   8. (A) Mr C Canning (B) NatWest Bank (C) John Smith (D) Francis Anderson
   9. (A) FORTY TWO POUNDS & 50P (B) 50 PENCE & FORTY TWO POUNDS (C) £42.50 (D) FORTY TWO DOLLARS & 50 ¢
   10. (A) 42-50 (B) 4250 (C) 425.00 (D) 4.25
   11. (A) Mr C Canning (B) C Canning (C) Mr F. Anderson (D) F. Anderson

3. We live on a planet full of __12.__. Today, there are a record number of stories about phenomena that __13.__ by science or logic. In other words, those bizarre situations are beyond humans. For example, many scientists have been researching the phenomenon of spontaneous combustion – in which a person suddenly catches fire for no apparent reason. Most experts believe that __14.__ connected with some kind of chemical reaction inside the body. Stories of strange events are circulated __5.__ the Internet, TV, and other media.

12. (A) mysterious and wondrous (B) mystery and magical (C) mystery and wonder (D) wonderful and magical
13. (A) cannot be explained (B) did not be explained (C) should not be explained (D) cannot explain
14. (A) it must be (B) it can't be (C) they must be (D) they can't be
15. (A) about (B) under (C) via (D) up

## II. Translation (20%)

**1. English – Chinese (10%)**

It isn't always easy for pedestrians to get around in a large city. A bustling city has many dangers that you should be aware of at all times. One of the many hazards people must face in Taiwan is that of motorcyclists riding on the sidewalks. It's almost impossible to walk without having a motorcycle roar up behind you.

**2. Chinese – English (10%)**

有些騎士是爲了找停車位，有些是想避過塞車。不管如何，這對行人而言是個令人頭痛的問題。目前，最佳解決之道就是要求騎士們上了人行道就下車。

## III. Reading Comprehension (30%)

**1-5**

The quest for tighter security measures at airports is going high-tech. Biometric technology, which relies on unique physical characteristics, is being tested to help

verify passengers' identifications. Biometrics – that could be a fingerprint, a face, or iris scan, stored on a computer database. **It** can make checking in a whole new experience. Aviation industry insiders say face recognition will become a major weapon in the war against terrorism. The human face has 80 landmarks, such as the bridge of the nose, the tip of the nose, the size of the mouth, the cheekbones, and the size of the eyes. Facial recognition technology needs only 14 to 20 of the landmarks to spot a face that **authorities** are looking for, for example, a suspected terrorist.

1. The main purpose of this passage is to
   (A) introduce face-recognition technology to airports.
   (B) introduce iris-scan technology to airports.
   (C) introduce fingerprinting technology to airports.
   (D) introduce high-tech products to airports.
2. According to the passage, the biometric technology employed in airports does NOT aim to
   (A) identify terrorists.
   (B) recruit aviation industry insiders.
   (C) screen passengers.
   (D) enhance airport security.
3. What does "**It**" in line 3 refer to?
   (A) a database.
   (B) a fingerprint.
   (C) biometrics.
   (D) facial landmarks.
4. The passage states that the human face has ___ landmarks.
   (A) 80
   (B) 14
   (C) 20
   (D) 14-20
5. **"Authorities"** in the context may refer to
   (A) the police
   (B) passengers
   (C) airport attendants
   (D) terrorists

**6-10**

A group of European scientists has announced that a frozen sea lies below the surface of Mars. Their interpretation is based on images of the Red Planet's near-equatorial region that show riverbed **features**, or valleys and canyons across an area 800 by 900 km. Besides, substantial amounts of hydrogen were found at the Mars poles. The team

suspect **hydrogen** in these quantities means water-ice, mixed with dirt and rock. Finding exposed ice at the equator would be unlikely. Very low pressures on the planet would lead to **sublimation** – the ice would erode over time straight to water vapour, but the research group believe that a crust of dust and volcanic ash, maybe one or two inches thick only, has prevented this happening.

6. Mars is also called
   (A) equator.
   (B) water-ice.
   (C) the Red Planet.
   (D) frozen sea.
7. How big is the near-equatorial region on Mars?
   (A) Less than 1km.
   (B) 1.125km.
   (C) 7200km.
   (D) 1700km.
8. "Riverbed **features**" in the context mean
   (A) a frozen sea.
   (B) the equator.
   (C) valleys and canyons.
   (D) near-equatorial region.
9. "**Hydrogen**" found on Mars represents
   (A) dust.
   (B) volcanic ash.
   (C) water.
   **(D)** a frozen sea.
10. What does "**sublimation**" in line 7 mean?
    (A) The volcanic ash is quite thick.
    (B) The ice would melt and becomes steam.
    (C) The crusts of dust are quite thick.
    (D) The pressure on Mars is very low.

## IV. Writing (20%)

Please introduce yourself. ( 200 words ~ 300 words )

# 國立高雄大學九十四學年度產業研發碩專班招生考試試題

系所(組別)：先進電子構裝技術產業研發碩士專班　科目：普通物理

考試時間：100 分鐘　　本科原始成績滿分 100 分

一、 請利用牛頓定律（Newton's law）說明單擺的振動（Oscillation）現像。（20%）

二、 請利用能量守恆（Energy Conservation Law）說明拋體運動（projectile motion）物體運動速度（velocity）與時間的關係$V$（t）？（10%）

三、 請利用卡諾循環（Carnot Cycle）說明冷凍機原理及其冷凍機的機械效益（efficience）。（10%）

四、 請利用高斯定律（Gauss' Law）說明為何導體電荷分佈在表面上。（20%）

五、 請利用斯涅身（Snell's Law）說明全反射現象（Total Reflection）。（20%）

六、 請利用迴路定律說明電容放電時電容端電壓與時間的關係 $V_c$（t）。（10%）

七、 請說明水波和聲波的相同和相異點。（10%）