國　立　宜　蘭　大　學

九十八學年度轉學招生考試

（考生填寫）
准考證號碼：

物　理　試　題

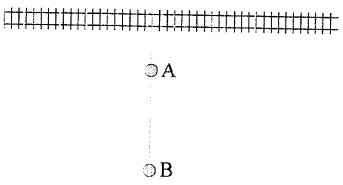
《作答注意事項》

1. 請先檢查准考證號碼、座位號碼及答案卷號碼是否相符。
2. 考試時間：60 分鐘。
3. 本試卷共有 10 題單選題，一題 8 分，共有 2 題計算題，一題 10 分共計 100 分。
4. 請將答案寫在答案卷上。(限用藍或黑色鋼筆、原子筆作答)
5. 考試中禁止使用大哥大或其他通信設備。
6. 考試後，請將試題卷及答案卷一併繳交。
7. 本試卷採雙面影印，請勿漏答。
8. 本試題附計算紙一張。

常數：$e=1.60\times10^{-19}$ Coul, $c=3.0\times10^{8}$ m/s, $h=6.626\times10^{-34}$ J·s$=4.14\times10^{-15}$ eV·s, $m_e=9.11\times10^{-31}$ Kg, $E_{photon}=1240(eV\cdot nm)/\lambda(nm)$, $\pi=3.142$, $\pi^2=9.870$, $1/\pi=0.3183$

單選題 10 題，每題 8 分

1. 一長直高架火車軌道旁同一水平面上，A、B 兩點，當一長列列車經過時，距離列車 3m 的 A 點，測量到 90 分貝的噪音，距離列車 R 的 B 點測量到的列車噪音爲 80 分貝。如果此處空間空曠，不考慮聲波被附近建築物以及地面的的反射，並且假設列車很長，視爲線波源(非點波源)。
R=(A)13m(B) 24m (C) 30m (D)120m.



2. A coating of MgF_2(n=1.40) on glass (n=1.50) is 800 nm thick. If white light is incident normally, which visible wavelengths are missing in the reflected light? (A) 498 nm (B) 560 nm (C) 571 nm (D). 600 nm

3. What is the magnetic field at the point P, center of the loop in Fig. 3 ? I=4A, R=20cm.
(A) 3.18 μ_0T (B) 6.82μ_0T (C) 10.0 μ_0T (D). 13.2μ_0T

4. How much current I flows through the bottom wire in Fig.4 , and in which direction?
(A)2.10A,→ (B)2.10A,←(C)0A (D)0.415A→.

5. Water flows from the pipe shown in the Fig.5 with a speed of v=4.0 m/s,.The water pressure as it exits into the air is P . The height of the standing column of water is h ,$P_{atm}=10^5$Pa, H=4m, $A_1=10cm^2$, $A_2=2.5cm^2$, **g=10m/s²**.Then (A) P= 1Pa, h =0.65 m (B) P=10^5 Pa, h =4.75 m (C) P=0.64 ×10^5 Pa, h =0.65 m (D) P=10^5 Pa, h =4.70 m

Fig. 3

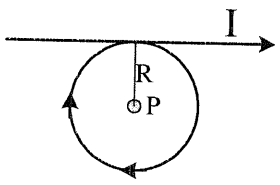


Fig. 4

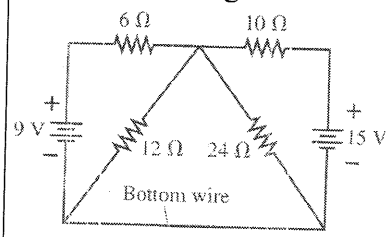
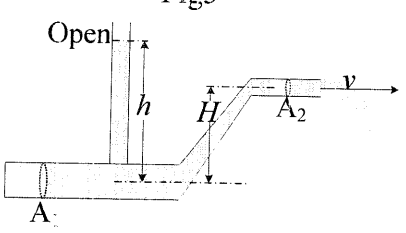
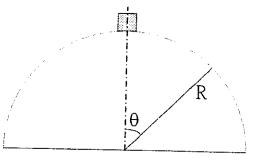


Fig5



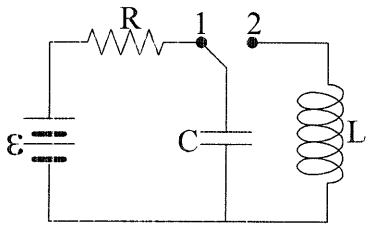
6. An Eskimo child slides on an icy (frictionless) hemispherical igloo of radius ***R***, as in figure. She starts with a negligible speed at the top.At what angle to the vertical does she lose contact with the surface?
θ=(A)$Cos^{-1}(1/3)$(B)$Cos^{-1}(2/3)$ (C) $Sin^{-1}(1/3)$ (D) $Sin^{-1}(2/3)$



7. (B4e52) Rain falls vertically at a constant 5 m/s. A tube is mounted on a railcar moving horizontally at 15 m/s. At what angle to the vertical should the tube be titled so that the water does not touch the sides? θ＝(A)$Cos^{-1}(3)$(B)$Cos^{-1}(1/3)$ (C)$Tan^{-1}(3)$ (D) Sin^{-1} (1/3)

8. A Carnot heat engine takes 100 cycles lo lift a 10 kg mass a height of 10 m. The engine exhausts 16 J of heat per cycle to a cold reservoir at 0°C. What is the temperature of the hot reservoir? (A)167°C (B)173°C (C)267°C (D)273°C.

9. The switch in figure at right has been in position 1 for a long time where R=6Ω, ε =12V, C=2.0 μF, L=5 mH. It is changed to position 2 at t = 0 s. What is the maximum current through the inductor? (A) 2.0A (B) 0.24A (C) 2.0 π A (D) 0.48 π A.



10. An electron confined in a one-dimensional box emits a 200 nm photon in a quantum jump from n = 2 to n = 1. What is the wave length of photon if the electron take a quantum jump from n = 3 to n = 1? (A)75nm(B)100nm (C)200nm (D)400nm.

計算問答題 2 題，每題 10 分，需詳列過程

11. (10%)證明題，需列過程 While charging the capacitor in a simple RC circuit. Show that the capacitor charge at time t is $Q = Q_{max}(1 - e^{-t/\tau})$, where $\tau = RC$.

12. (10%)計算題，需列過程 A long straight coaxial cable has an inner wire of radius a that carries a linear charge density λ c/m and an outer cylindrical shell of radius b that has a linear charge density - λ find the field in the regions(A)a<r<b and (B)r>b