UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2022/2023

COURSE NAME	:	PHYSICS FOR ELECTRICAL ENGINEERING
COURSE CODE	:	DAE 13103
PROGRAMME CODE	:	DAE
EXAMINATION DATE	:	FEBRUARY 2023
DURATION	:	2 HOURS AND 30 MINUTES
INSTRUCTION	:	1. ANSWER **ALL** QUESTIONS
		2.THIS FINAL EXAMINATION IS CONDUCTED VIA **CLOSED BOOK.**
		3.STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK

THIS QUESTION PAPER CONSISTS OF **SIX (6)** PAGES

Q1 (a) In **Figure Q1 (a)** a rescue plane flies at 198 km/h and constant height h = 500m toward a point directly over a victim, where a rescue capsule is to land.

(i) Calculate the time taken by a rescue capsule is to land.

(3 Marks)

(ii) Determine the angle of the pilot's line of sight to the victim when the rescue capsule release is made.

(5 Marks)

(iii) Determine the velocity in unit-vector notation as the rescue capsule reaches the water.

(8 Marks)

(b) A large household air conditioner may consume 15.0 kW of power. This air conditioner work 3 h per day for 30 d if the cost of electricity is RM 0.110 per kW·h

(i) Differentiate the relationship between conservative energy and non-conservative energy. State example for each type.

(4 Marks)

(ii) Calculate is the cost of operating.

(5 Marks)

Q2 (a) Define heat transfer by convection.

(1 Mark)

(b) The phase change of a material from liquid to solid is given by graph in **Figure Q2(b)**. Given the mass of the material is 0.400 kg, t_s=80 min, and specific heat of material at liquid phase is 3000 J/kg.K. Calculate:

(i) Heat required to to be removed from body to reach freezing point

(4 Marks)

(ii) Heat Transfer rate.

(3 Marks)

(iii) Latent heat of fusion of the material.

(4 Marks)

(iv) Specific heat capacity of material in solid phase.

(5 marks)

(c) A 230 g piece of ice at -5°C is dropped into a jar containing 3L of water at 55°C. Given the specific heat capacity of water is 4186 JKg^{-1} K^{-1}, the specific heat capacity of ice is 2100 JKg^{-1} K^{-1} and the latent heat of fusion of ice is 3.34×10^5 JKg^{-1}. By assuming no heat is exchange with the surroundings or the jar.

(i) Define concept of Thermal equilibrium.

(2 Marks)

(ii) Calculate the final temperature of the system.

(6 Marks)

Q3 (a) By referring to the **Figure Q3(a)**;

(i) Determine the magnitude and direction of electric field at origin (0,0).

(13 Marks)

(ii) Calculate the electric potential at origin (0,0).

(9 Marks)

(b) Draw the electric field lines for the following charges:

(i) Between positive-negative charges.

(2 marks)

(ii) Single positive charge.

(1 mark)

Q4 (a) Find current flows through a bulb of 3.00-V flashlight when its hot resistance is 3.60 Ω?

(4 Marks)

(b) A 20.0-m-long piece of 12-gauge copper wire having a 2.053-mm diameter. (Given resistivity of copper 1.72×10^{-8} Ω.m)

(i) Explain factor of length and cross section toward the resistance of cylindrical conductor

(2 Marks)

(ii) Calculate the resistance

(4 Marks)

(c) 3 wires with current flow 2 Amps stand at a square corner with distance 1 cm each. A point P is located at another corner of the square as shown in **Figure Q4(c)**.

(i) Calculate magnetic field experienced by point P from wire 1,2, and 3.

(7 Marks)

(ii) Find net magnetic field on that point

(8 Marks)

-END OF QUESTIONS –

FINAL EXAMINATION

SEMESTER / SESSION : SEM 1 / 2022/2023 PROGRAMME CODE : DAE
COURSE NAME: PHYSICS FOR ELECTRICAL ENGINEERING COURSE CODE : DAE 13103

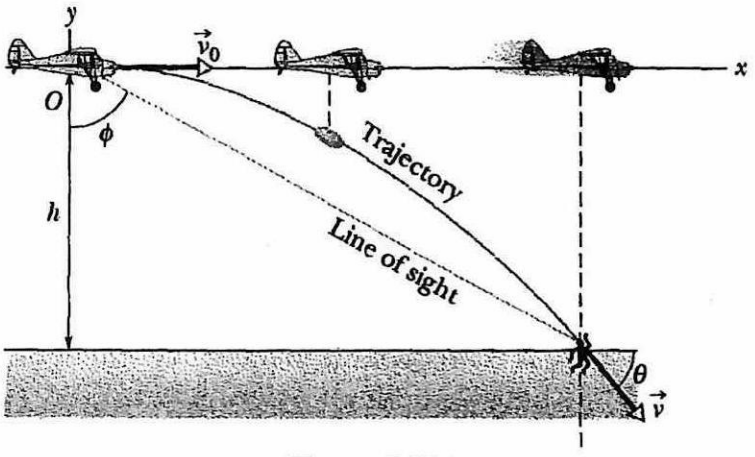

Figure Q1(a)

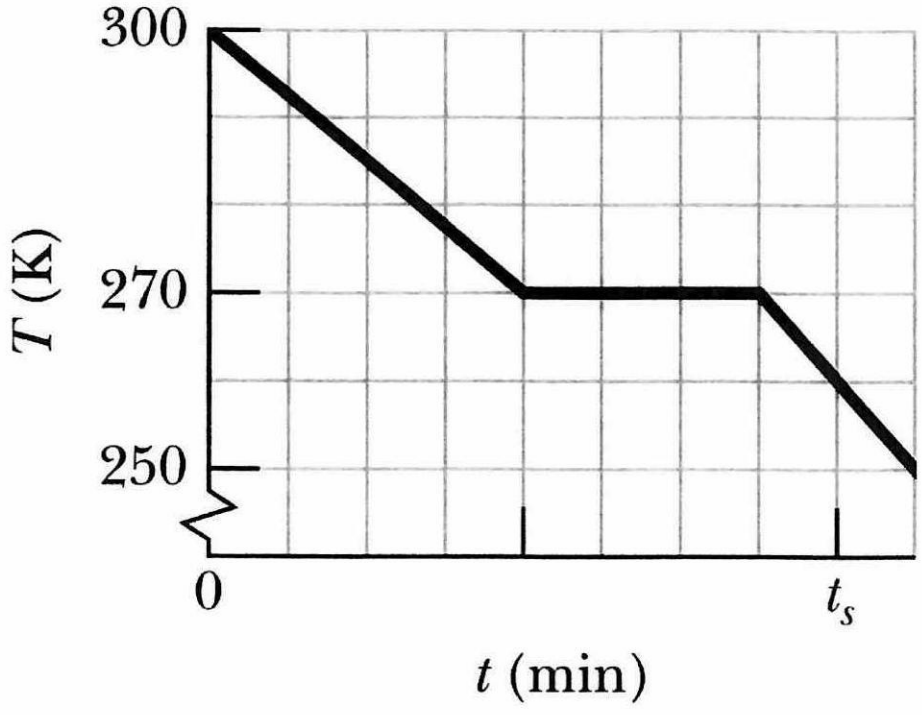

Figure Q2 (b)

FINAL EXAMINATION

SEMESTER / SESSION : SEM 1 / 2022/2023 PROGRAMME CODE : DAE
COURSE NAME: PHYSICS FOR ELECTRICAL ENGINEERING COURSE CODE : DAE 13103

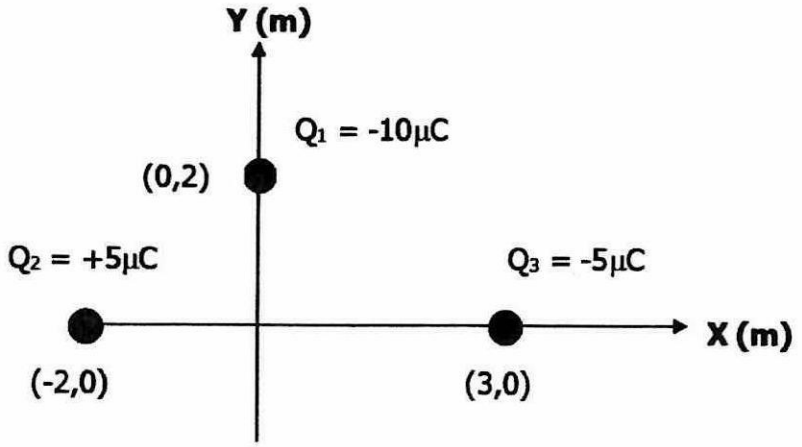

Figure Q3(a)

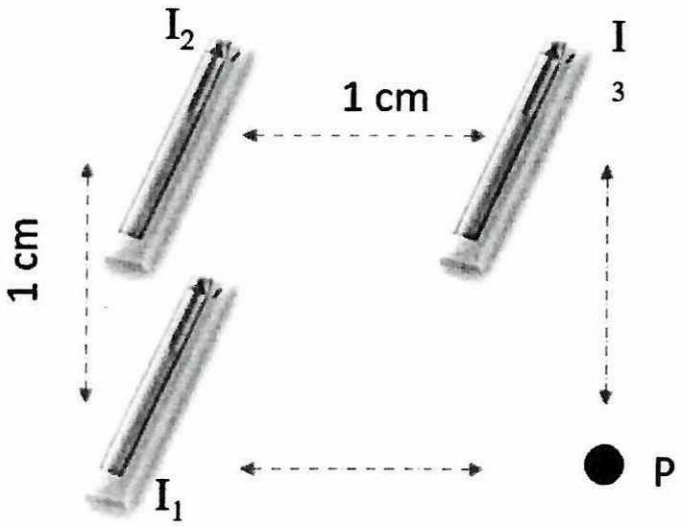

Figure Q4 (c)

FINAL EXAMINATION

SEMESTER / SESSION : SEM 1 / 2022/2023 PROGRAMME CODE : DAE
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LIST OF FORMULAS

$T_K = T_C + 273.15$

$a_c = \frac{v^2}{r}$

$T_C = \frac{T_F - 32}{1.8}$

$\vec{p} = m\vec{v}$

$K = \frac{1}{2}mv^2$

$\Delta E = W = F_{\parallel} = Fd\cos\theta$

$\omega = \omega_0 + \alpha t$

$U_s = \frac{1}{2}kx^2\sqrt{\frac{Y}{\rho}}$

$F_b = \rho g V$

$\rho = \frac{m}{V}$

$n_1 \sin\theta_1 = n_2 \sin\theta_2$

$Q = mc\Delta\theta$