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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2023/2024**

- COURSE NAME : PHYSICS
- COURSE CODE : BNS 10602
- PROGRAMME CODE : BNS
- EXAMINATION DATE : JULY 2024
- DURATION : 2 HOURS 30 MINUTES
- INSTRUCTIONS :
1. ANSWER ALL QUESTIONS
 2. THIS FINAL EXAMINATION IS CONDUCTED VIA
 - Open book
 - 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 FIVE (5) PAGES

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Q1 Lenses are the optical components that form the basic building blocks of many common optical devices. Lenses are essentially light-controlling elements and are exploited for light gathering and image formation.

(a) List out **SIX (6)** application of mirrors in daily life.

(6 marks)

(b) Explain the differences between convex lens and concave lens, based on its definition, diagram and give **ONE (1)** example for each lens.

(6 marks)

(c) Explain the differences between specular reflection and diffuse reflection, based on:

- (i) Definition
- (ii) Surface characteristics
- (iii) Result
- (iv) Example

(8 marks)

Q2 Power and energy consumption are important concepts related to electrical appliances. The term of energy efficiency refers to the use of less input to achieve higher efficiency levels.

(a) Identify **FOUR (4)** ways to save the usage of electrical energy in an office environment.

(4 marks)

(b) Based on your answer in **Question 2 (a)**, provide **ONE (1)** example with explanation for each ways to improve the energy efficiency in an office environment.

(8 marks)

(c) **Table APPENDIX A.1** shows all types of electrical appliances used in a home for one day. If the cost of 1 unit of electrical energy is RM0.22 for first 100 units and RM0.18 for the subsequent units, analyse the cost of electrical energy usage of the electrical appliances for 30 days.

(8 marks)

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Q3 A worker is pulling a 35 kg box for 20 meter along a horizontal surface with coefficient of friction is 0.7, as shown in **Figure APPENDIX B.1**. The worker is exerting a force (F) on the box at $\Theta = 40^\circ$. If the worker pulling the box at a constant acceleration of 0.5ms^{-2} :

(a) Analyse the exerting force (F) of the box.

(12 marks)

(b) Analyse the normal force (F_N) of the box.

(4 marks)

(c) Analyse the total work done by worker.

(4 marks)

Q4 Sound waves can be used for communication, music and other applications that rely on sound travelling through air. Sound can also travel through liquids and solids. Sound travels faster through water than it does through air, and also travels greater distances in water than in air.

(a) Explain these terminologies based on its definition, diagram and give **ONE (1)** example for each terminologies:

- (i) Transverse wave
- (ii) Longitudinal wave

(8 marks)

(b) A plane progressive wave which is travelling to the right and is represented by the equation, $y = 0.6 \sin (30\pi t - \frac{10\pi x}{15})$, where y in cm, t in seconds and x in meter.

(i) Analyse the frequency, wavelength and speed of the wave.

(6 marks)

(ii) Analyse and write the new wave equation of progressive wave, when the wave moving with the same speed in the opposite direction, having triple amplitude and double frequency.

(6 marks)

- END OF QUESTIONS -

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APPENDIX A

Table APPENDIX A.1 Types of electrical appliances used in a home for one day

Appliance	Number of units	Power (W)	Time (Hour)
Television	4	700	8
Air conditioner	4	1200	6
Rice cooker	1	700	1
Fan	10	70	10
Fridge	1	400	16

APPENDIX B

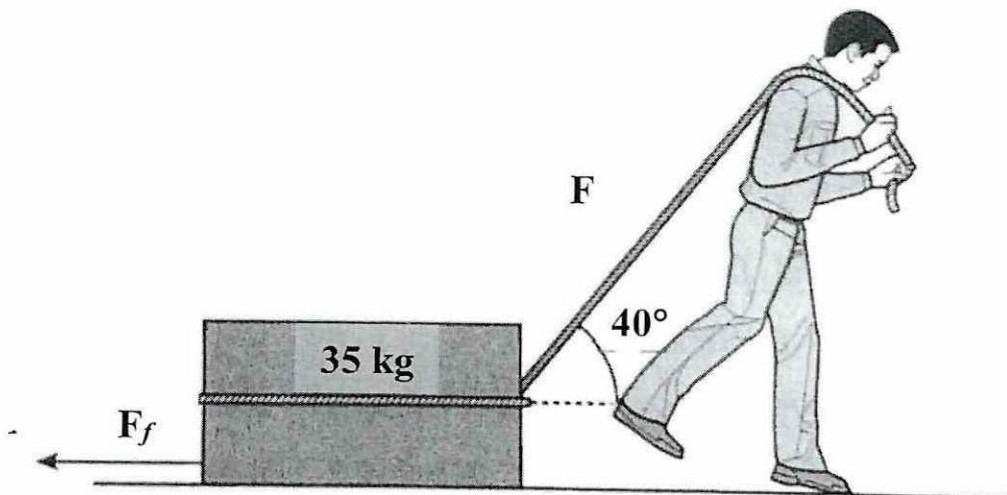


Figure APPENDIX B.1

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GIVEN EQUATION:

$$\text{Force, } F = ma$$

$$\text{Normal Force, } F_N = N$$

$$\text{Gravity Force, } F_g = W$$

$$\text{Frictional Force, } F_f = \mu N$$

Object static on horizontal surface

$$\text{Force along } x - \text{axis: } \sum F_x = 0$$

$$\text{Force along } y - \text{axis: } \sum F_y = 0$$

Object motion on horizontal surface

$$\text{Force along } x - \text{axis: } \sum F_x = ma$$

$$\text{Force along } y - \text{axis: } \sum F_y = 0$$

$$\text{Gravity, } g = 9.81 \text{ ms}^{-2}$$

$$\text{Work, } W = Fs$$

$$\text{Total Work, } \sum W = \sum Fs$$

$$\text{Progressive wave, } y(x, t) = A \sin(\omega t \pm kx)$$

$$\text{Frequency, } f = \frac{1}{T}$$

$$\text{Angular frequency, } \omega = \frac{2\pi}{T}$$

$$\text{Wavelength, } \lambda = \frac{2\pi}{k}$$

$$\text{Wave number, } k = \frac{2\pi}{\lambda}$$

$$\text{Speed of wave, } v = f\lambda$$

$$\text{Energy consumed, } E = Pt$$

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