Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
(ONLINE)
SEMESTER II
SESSION 2020/2021

COURSE NAME	:	PHOTONIC DEVICES
COURSE CODE	:	BEJ 33002
PROGRAMME CODE	:	BEJ
EXAMINATION DATE	:	JULY 2021
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWERS **ALL** QUESTIONS OPEN BOOK EXAMINATION

THIS QUESTION PAPER CONSISTS OF **THREE (3)** PAGES

Q1 (a) High-brightness Gallium Nitride (GaN) light-emitting diodes (LEDs) are used in applications such as daylight visible full-color LED displays, white LEDs and blue laser devices. The properties of GaN are compatible to be used optolectroelectronics applications. State **TWO (2)** properties of GaN.

(2 marks)

(b) Green LEDs is widely used to treat dilated capillaries, sagging skin around the eyes, under eye circles, hyperpigmentation and sun spots.

(i) Fabricate a green LEDs with Aluminium Gallium Phosphide (AlGlP). Show all the calculation.

(8 marks)

(ii) If the AlGlP is suggested to be used in producing yellow LEDs. Propose a proper process to produce yellow LEDs that incorporate AlGlP?

(2 marks)

Q2 (a) Solar energy is one of renewable energy. Explain clearly how the solar source works to produce energy in the photovoltaic cell.

(5 marks)

(b) The list of materials and consumables in **Table Q2(b)** are given to fabricate a single junction solar cell.

Table Q2(b): List of materials and consumables

Substrate	Metal Oxide	Metal
FTO	ZnO	Au
ITO	Cu_2O	Ag
Glass	CuO	Pt
Quartz	TiO	Cu
Silicon	Ti_2O	Al

(i) Design a single junction solar cell with selection of material and consumables from **Table Q2(b)**.

(4 marks)

(ii) Justify your selection in **Q2(b)(i)**.

(4 marks)

Q3 A photodetector is also known as a photosensor.

(a) Describe briefly the working mechanism of photodetector.

(4 marks)

(b) Atomic Force Microscope (AFM) is one of the machines that using photodetector. Demonstrate the principle operation of AFM with the aid of diagram.

(8 marks)

Q4 Laser is a device that stimulates atoms or molecules to emit light at particular wavelengths and amplifies that light, typically producing a very narrow beam of radiation.

(a) Coherence is one of laser characteristics. List **THREE (3)** other characteristics of laser that make it unique compared to ordinary light source.

(3 marks)

(b) Analyze the difference between coherence and ordinary light source using a suitable diagram.

(10 marks)

-END OF QUESTIONS -