Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2019/2020

COURSE NAME	:	THERMAL ENVIRONMENTAL DESIGN
COURSE CODE	:	BDE 40903
PROGRAMME	:	BDD
EXAMINATION DATE	:	DECEMBER 2019/ JANUARY 2020
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **FOUR (4)** QUESTIONS **ONLY**.

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

Q1 (a) Analyze the development of two thermal comfort public domain database which helped increase the level of thermal comfort research activity worldwide.

(8 marks)

(b) Assess these three categories of adaptive thermal comfort with elaboration and example;
(i) Physiological adaptation;
(ii) behavioral adaptation; and
(iii) psychological adaptation.

(7 marks)

(c) Distinguish the difference between dry bulb temperature, wet bulb temperature, mean radiant temperature, operative temperature and equivalent temperature.

(10 marks)

Q2 (a) Compare the difference of contents between ISO 7730-2005 standard with ASHRAE 55-2013 standard.

(8 marks)

(b) You had been hired as the heat stress assessor for a biscuit factory in Perak. Most of the workers of the company were foreign workers and worked in the factory daily from 8.00 a.m until 7.00 p.m. The factory management, received an employee complaint regarding heat stress in the baking section. The complaint alleged that employees were working in hot temperature cause by the radiant heat of the industrial oven during baking process. They felt dehydrated, the temperature may have affected an employee's breathing, an employee was sent to the emergency room for heat exhaustion, and the conditions were unworkable. As the heat stress assessor; propose heat stress investigation that will be carried out to the company with appropriate elaboration.

(10 marks)

(c) Firefighting tasks require tremendous energy and exposure to tremendous amount of heat. Evaluate the possible heat injuries firefighters are exposed to.

(7 marks)

Q3 (a) Sick Building Syndrome (SBS) is define as

'An increase in the frequency of building occupant reported complaints associated with acute non-specific symptoms in non-industrial environments that improve while the occupants are away from the building'(WHO, 1988)

Examine the factors associated with SBS.

(6 marks)

(b) Analyze the advantages and disadvantages of a split unit and a centralized chiller system.

(6 marks)

(c) The Predicted Mean Vote (PMV) model of thermal comfort created by Fanger in the late 1960s is used worldwide to assess thermal comfort.

(i) Describe briefly about PMV model; and

(ii) criticize the PMV model based on the environmental engineering practice requirement for a predictive method that is applicable to all types of people in any kind of building in every climate zone.

(13 marks)

Q4 (a) Integrate the relation between PMV (Predicted Mean Vote) and PPD (Predicted Percentage of Dissatisfied) in thermal comfort studies.

(8 marks)

(b) Select measures that can be conducted for heat stress engineering control and administrative control.

(8 marks)

(c) University student athletes are often involved in long hours of training under the sun during the day. Recently, the annual average ambient temperature has increased due to global warming and climate change. Thus, the risk of heat stress on the athletes become high. Propose several recommendation to reduce the risk of heat stress of the university student athletes without reduction in the duration of training sessions.

(9 marks)

Q5 (a) You have been hired as the indoor air quality assessor for an office building. The office staffs works in an air-conditioned environment. However, the office workers often complain of dizziness, headache, nausea and eye irritations. As the indoor quality assessor;

(i) Propose the minimum standard for basic requirements that must be fulfilled by the company to avoid discomfort and/or adverse health effect among employees according to Industry Code of Practice on Indoor Air Quality, 2010.
(8 marks)

(ii) Construct a flowchart for indoor air quality investigation and assessment that you will conduct.
(8 marks)

(iii) Propose several solutions on improving the indoor air quality in the workplace based on the possible indoor pollutants exists in the workplace.
(9 marks)

- END OF QUESTION -