

**CONFIDENTIAL**



**UTHM**  
Universiti Tun Hussein Onn Malaysia

**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER II  
SESSION 2018/2019**

**COURSE NAME** : MECHANICAL & ELECTRICAL SYSTEM  
**COURSE CODE** : BFC32602  
**PROGRAMME CODE** : BFF  
**EXAMINATION DATE** : JUNE 2019  
**DURATION** : 2 HOURS  
**INSTRUCTION** : ANSWER ALL QUESTIONS.  
**DO NOT BRING THIS QUESTION PAPER OUT OF THE EXAMINATION HALL.**

THIS QUESTION PAPER CONSISTS OF ELEVEN (11) PAGES

**TERBUKA**

**CONFIDENTIAL**

**SECTION A**

Answer all questions in an **OMR form** provided (30 questions, total marks = 60).

- Q1** What is the main function of the mechanical and electrical (M&E) system in building?
- A. To protect the building occupants from rain, wind, snow and sun
  - B. To create consistent and more productive indoor environment for the occupants
  - C. To show the living standards of the occupants and protect them from thief
  - D. To shelter the building occupants from harsh conditions from outside of the building
- Q2** Which of the followings is **TRUE** about scope of building operation systems.
- A. Site utilities, plumbing system and fire protection system
  - B. Electrical power, lighting and communication systems
  - C. Building transportation, processing and automation systems
  - D. Gas pipelines, fire alarm and special systems
- Q3** All of the followings are building system features, **EXCEPT**:
- A. Road and car park
  - B. Power supply
  - C. Air quality
  - D. Lighting
- Q4** The hypermarket sometime is built as a block-type building without windows. Which of the followings mechanical and electrical system will be installed in this type of building?
- I. Lighting system
  - II. High speed vertical transportation
  - III. Fire safety system
  - IV. Mechanical ventilation system
- A. All of the above
  - B. I, II and III
  - C. I, III and IV
  - D. III, III and IV
- Q5** Identify the related mechanical and electrical system that must be taking into the design consideration for high rise building.
- I. High pressure water system
  - II. High speed vertical transportation
  - III. Fire safety system
  - IV. Mechanical ventilation system
- A. All of the above
  - B. I, II and III
  - C. I, III and IV
  - D. III, III and IV

**TERBUKA**  
**CONFIDENTIAL**

- Q6** Integrated Building Management System (IBMS) is a smart building system, in which the system consists of the following components, **EXCEPT**:
- A. Security system
  - B. Building automation system
  - C. Traffic management system
  - D. Fire detection and alarm System
- Q7** Which of the following symbols refers to the official unit of energy?
- A. W
  - B. J
  - C. K
  - D.  $W/m^2\text{ }^\circ\text{C}$
- Q8** Which of the followings is **FALSE** about thermal mass?
- A. Materials that have the capacity to storage thermal energy for extended periods
  - B. Absorb daytime heat gains (reducing cooling load) and release heat during night (reduce heat load).
  - C. Higher initial temperature than the surrounding air (act as heat sink).
  - D. Beneficial for country which had a big different between day and night outdoor temperature.
- Q9** Which of the followings is/are **TRUE** about the physical and psychological comfort?
- I. Temperature - Thermal comfort
  - II. Quality of air - Thermal comfort
  - III. Lighting Environment - Visual comfort
  - IV. Acoustic Environment - Aural comfort
- A. All of the above
  - B. II and III
  - C. I, III and IV
  - D. IV only
- Q10** Which of the followings is/are **TRUE** about the ways of heat loss from a building at four season country?
- I. Windows contribute 10% of total heat loss
  - II. Root contribute 25% of total heat loss
  - III. Walls contribute 35% of total heat loss
  - IV. Through the floor contribute 15% of total heat loss
- A. All of the above
  - B. II and III
  - C. I, II and IV
  - D. IV only

**TERBUKA**



**Q15** Identify which of the followings is/are potential building(s) to be fitted with Exhaust Fresh Up system?

- I. Terrace house
- II. Shopping complex
- III. Apartment and hotel
- IV. Hospital

- A. I only
- B. I and II
- C. III and IV
- D. IV only

**Q16** Arrange the following stack effect processes in a complex building in correct sequence.

- I. Movement of air inside and outside of the building
- II. Pressure difference occur due to a difference in indoor to outdoor air density resulting from temperature and moisture difference
- III. Indoor warm air rises up produces negative pressure at the bottom
- IV. Positive indoor pressure is created at the top
- V. Warmer indoor air flows out of the building through opening near its top
- VI. Colder outside air enters the building near its base

- A. II → I → III → V → IV → VI
- B. I → II → III → IV → V → VI
- C. III → I → IV → V → II → VI
- D. II → I → V → III → IV → VI

**Q17** According to Occupational Safety and Health Act (OSHA), escape route can be defined as:

- A. a fastest and non-obstructed path of exit travel from any point within a workplace to a place of safety.
- B. a shortest and non-obstructed path of exit travel from any point within a workplace to a place of safety.
- C. an uninterrupted and non-obstructed path of exit travel from any point within a workplace to a place of safety.
- D. a continuous and shortest path of exit travel from any point within a workplace to a place of safety.

**Q18** Which of the following statements are **TRUE** about the selection of active fire protection?

- I. Fire detection system is one of the active fire protections
- II. Fire extinguishers are intended as the first choice of action to cope with small fires
- III. Foam systems are inappropriate for computer room fire
- IV. Water pressure in the distribution piping system does affect the efficiency of dry sprinkler system

- A. I and II
- B. II and III
- C. I, II and IV
- D. II and IV

**TERBUKA**

**CONFIDENTIAL**

- Q19** A good building design should consider the following fire safety measures, **EXCEPT**:
- A. Building services should be designed to minimize the spread of fires
  - B. Avoid compartmentation of floor space to clear the way to escape route
  - C. Apply the concept of compartmentation on each of floor design
  - D. Exit door must swing out in the direction of exit travel
- Q20** Which of the followings is **NOT** relevant factor for estimating the waiting interval for a group of lifts?
- A. The quality of service required
  - B. The round-trip time for one lift
  - C. The type of lift drive
  - D. The size of lift car
- Q21** Which of the followings is **INCORRECT** when comparing the suitability of moving walks and escalators of the same capacity. A moving walk:
- A. Requires more floor space for installation
  - B. Can accommodate trolleys better
  - C. Gives a greater restriction to traffic flow when stopped
  - D. Requires a greater truss depth
- Q22** Which of the followings are **TRUE** about the electrical simple rules?
- I. One watt is one joule per second
  - II. One amp is one coulomb per second
  - III. If you double the voltage, the current will halve
  - IV. If you double the resistance, the current will double
- A. I and II
  - B. II and III
  - C. I and III
  - D. III and IV
- Q23** Electricity is a basic part of nature and it is one of most widely used forms of energy. Which of the followings is/are classified as renewable energy?
- I. Nuclear power and wind power
  - II. Hydropower and coal power plant
  - III. Petroleum and natural gas
  - IV. Wind power and solar power
- A. None of the above
  - B. All of the above
  - C. I only
  - D. IV only

**TERBUKA**

**CONFIDENTIAL**

**Q24** An overcurrent occurs when a larger intended electric current exists through a conductor, leading to excessive generation of heat, and risk of fire or damage to the equipment. Identify the cause(s) of the overcurrent in an electric power.

- I. Incorrect design system
- II. Ground fault
- III. Short circuits
- IV. Excessive load

- A. All of the above
- B. I, and II
- C. I only
- D. I, II and III

**Q25** All of the followings is/are **TRUE** about one phase power supply, **EXCEPT**:

- I. The most common method used by electric power distribution grid
- II. It is used when loads are mostly lighting and heating
- III. Widely used especially in rural areas
- IV. The delay between phases has the effect of giving constant power transfer over each cycle of the current

- A. I only
- B. II and III
- C. I and III
- D. II and IV

**Q26** The criteria of water for human consumptions are as follows, **EXCEPT**:

- A. Clear in colour
- B. No weird taste
- C. Moderately in suspended matter content
- D. Medium level of hardness

**Q27** Identify the **TRUE** purpose of supply pipe in the typical domestic supply system.

- A. To supply clean water to the water closet
- B. To supply clean water to the storage tank and kitchen sink
- C. To supply clean water to the house boundary
- D. To supply clean water to all the water taps.

**Q28** **Figure Q28** shows the basic storage cistern components for a typical domestic water supply of a house. One of the components is known as an outlet pipe. Based on the following descriptions, distinguish the true criteria for this component:

- I. To prevent stagnation of water
- II. Should always located at the opposite side to the inlet
- III. To discharge an overflow water
- IV. Can act as secondary drain off pipe for maintenance purpose

- A. I only
- B. I and II
- C. I, II and III
- D. I, II and IV

**TERBUKA**

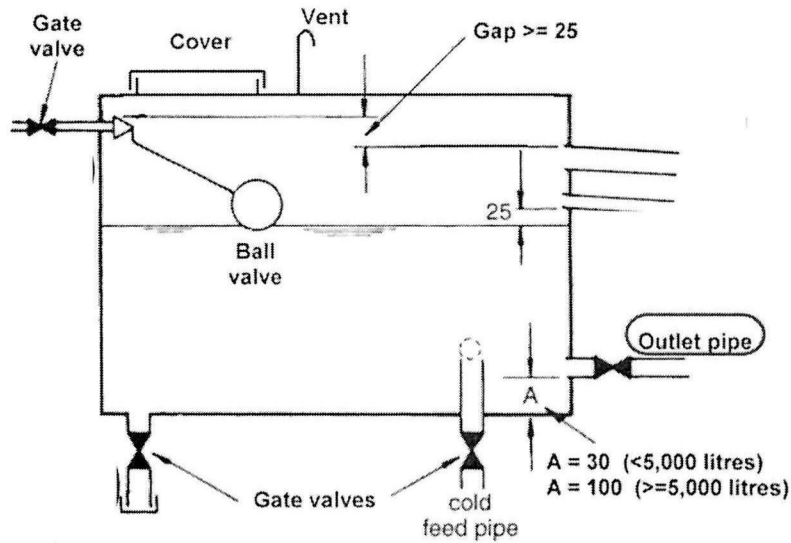


FIGURE Q28: Basic storage cistern components for a typical domestic water supply

- Q29 Which of the followings is **NOT** included in the program of water efficiency approach?
- A. Water recycling
  - B. Water efficient fittings
  - C. Water efficient irrigation
  - D. Water efficient distribution
- Q30 Water for recycling can be divided into two categories which are treated and untreated grey water. Identify the general purpose that can be used from the untreated grey water.
- A. Direct sub-surface garden irrigation
  - B. Laundry washing
  - C. Toilet flushing
  - D. Vehicle washing



**SECTION B**

*Answer all questions.*

- Q31** (a) Explain with example, **TWO (2)** passive design factors affecting energy use in buildings. (4 marks)
- (b) **Figure Q31** shows a portion of wall for an office building in Alor Setar, Kedah. The composition of the wall includes 15mm glass window ( $R=1.0 \text{ m}^2 \text{ }^\circ\text{C}/\text{W}$ ) and 125mm of clay brick ( $\lambda=0.75 \text{ W/m }^\circ\text{C}$ ) covered with 15mm thick cement plaster ( $\lambda = 0.15 \text{ W/m }^\circ\text{C}$ ) finishes on both sides. Calculate the average U-value for the wall. (6 marks)
- Q32** A client requests to incorporate natural ventilation for a new construction of a double-storey bungalow. Propose **FIVE (5)** approaches to incorporate natural ventilation in the bungalow. (10 marks)
- Q33** There are four classes of fire. Explain **TWO (2)** of the fire classes by providing:
- (a) The sources of fires and the examples of suitable firefighting agent. (6 marks)
- (b) **TWO (2)** preventive actions for each class which explained in **Q33(a)**. (4 marks)
- Q34** Based on Series-Parallel circuits (Combination Circuit) as shown in **Figure Q34**, calculate the following :
- (a) The total resistance ( $R_T$ ) in the circuit. (8 marks)
- (b) The total current (I) flows through the circuit. (2 marks)

– END OF QUESTIONS –

**TERBUKA**

FINAL EXAMINATION

SEMESTER/SESSION : SEM II / 2018/2019  
COURSE NAME : MECHANICAL & ELECTRICAL SYSTEM

PROGRAMME CODE : 3BFF  
COURSE CODE : BFC32602

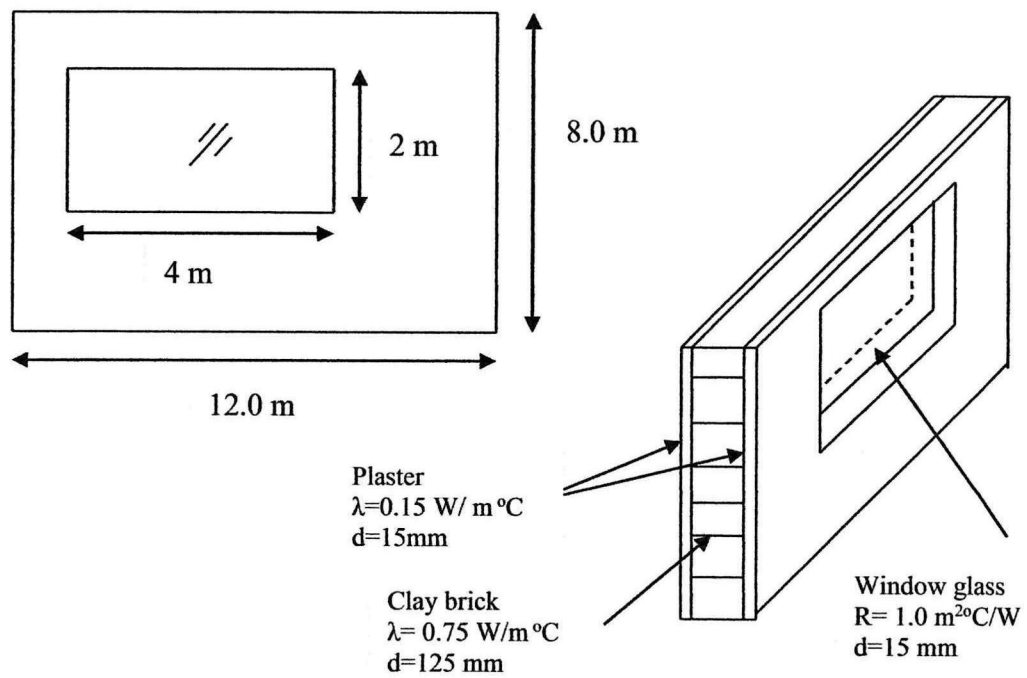


FIGURE Q31: Wall for an Office Building in Parit Raja, Batu Pahat

TERBUKA

FINAL EXAMINATION

SEMESTER/SESSION : SEM II / 2018/2019  
COURSE NAME : MECHANICAL & ELECTRICAL SYSTEM

PROGRAMME CODE : 3BFF  
COURSE CODE : BFC32602

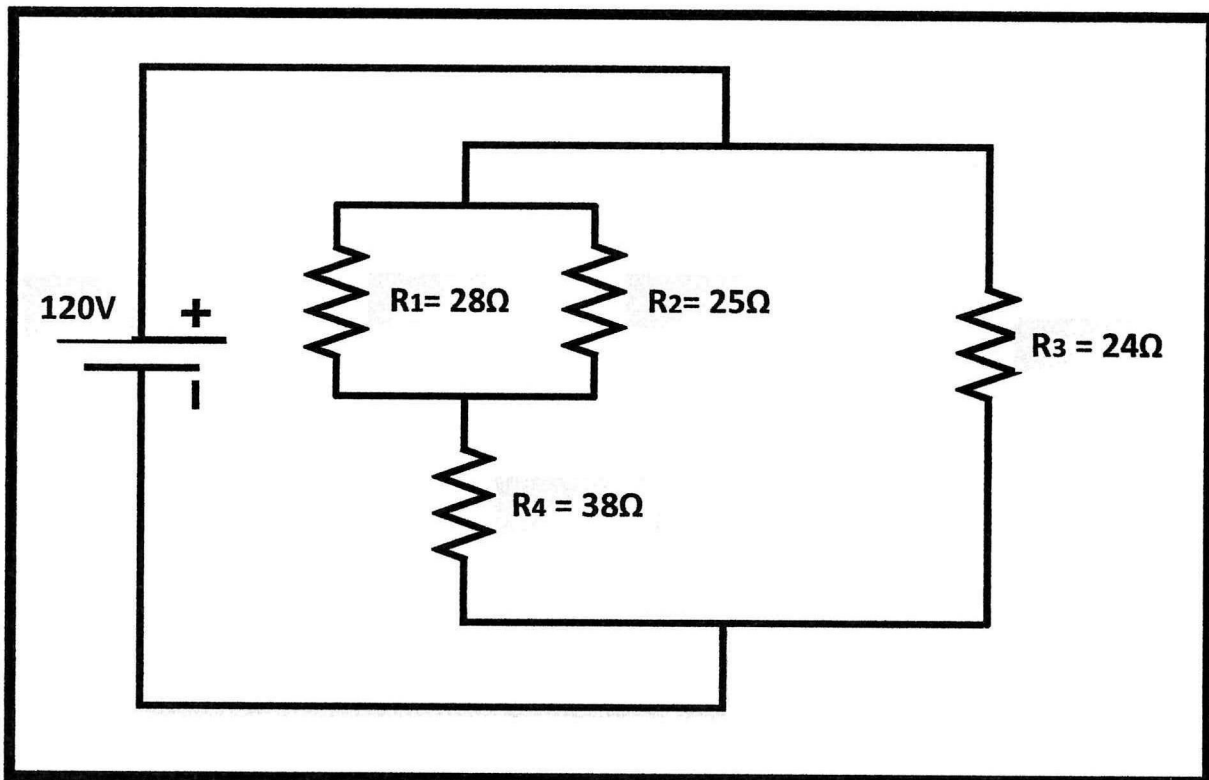


FIGURE Q34

TERBUKA