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**UTHM**

Universiti Tun Hussein Onn Malaysia

**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER II  
SESSION 2021/2022**

- COURSE NAME : SUSTAINABLE CONSTRUCTION  
MANAGEMENT
- COURSE CODE : BNC 31202
- PROGRAMME CODE : BNC
- EXAMINATION DATE : JULY 2022
- DURATION : 2 HOURS
- INSTRUCTIONS :
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 **EIGHTEEN (18)** PAGES

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Indicate the best choice for each question in the indicated space. Each correct answer is worth 1 mark. There is no penalty for incorrect answers. Select only one answer per question, or your answer will be counted as incorrect.

1. One of the most important aspects of the design of a Green Building is the implementation of low impact, renewable and sustainable energy sources. Which of the following is **NOT** an ideal energy source for a Green Building?
  - A. Natural gas
  - B. Solar
  - C. Wind
  - D. Biomass
  - E. Sea waves
  
2. Which of the following is **NOT** a benefit of Green Building?
  - A. Reduces or eliminates negative impacts on the natural environment
  - B. Preserves natural resources
  - C. Improves quality of life
  - D. Increases the carbon footprint of buildings
  - E. Generates fewer greenhouse gases
  
3. What types of features can be incorporated to make a building 'green'?
  - A. Efficient use of energy, water and natural resources
  - B. Use of renewable energy sources
  - C. Pollution and waste reduction features
  - D. Excellent indoor environmental air quality
  - E. Use of non-toxic, ethical and sustainable building materials
  - F. All of the above
  - G. None of the above
  
4. While Green Buildings have many benefits to the environment, there is a more costly investment than traditionally constructed buildings.
  - A. True
  - B. False
  
5. Which of the following is **NOT** a characteristic of green building material?
  - A. It should be reusable or recyclable
  - B. It should be durable and weather-resistant
  - C. It should be energy-intensive to produce or obtain
  - D. It should be made from locally sourced materials
  - E. It should consist of natural non-toxic material
  
6. Concrete is necessary to build a strong foundation for a home or building, making it impossible to be neglected during the construction process.
  - A. True
  - B. False

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7. An example of an alternative concrete building material that has a lower environmental impact is:
  - A. recycled plastic
  - B. wooden piers
  - C. earthbags
  - D. All of the above
  - E. None of the above
  
8. Which flooring option would be the most eco-friendly and have the lowest environmental impact?
  - A. Hardwood
  - B. Concrete
  - C. Tile
  - D. Bamboo
  - E. Glass
  
9. How can you reduce water consumption in a green building? Select the wrong responses.
  - A. Install low-flow toilets
  - B. Rainwater harvesting
  - C. Greywater recycling
  - D. Reduce water pressure
  - E. Install low-efficiency plumbing fixtures
  
10. What is the name for an area that has **NOT** been developed, compacted, or cleared that could support open space, habitat, or natural hydrology?
  - A. Greenfield
  - B. Bottleneck
  - C. Blackfield
  - D. Brownfield
  
11. Which of the following provide detailed information on the safety procedures, chemical composition, and health effects of materials and products?
  - A. Safety Data Sheets
  - B. Measurement and Verification Plan
  - C. Substance Scorecard
  - D. Detailed Product and Procedure Plan
  
12. You're trying to lessen the footprint of your building. This will have a positive effect on which of the following?
  - A. Public Transit Access
  - B. Parking Capacity
  - C. Open Space
  - D. Capacity for Recycling
  
13. Which of the following is a property where redevelopment, expansion, or reuse can be complicated by the possible presence of hazardous substances?
  - A. Blackfield
  - B. Greenfield
  - C. Brownfield
  - D. Whitefield

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14. Which of the following points does the life cycle approach of a project begin?
  - A. Property Cleaning
  - B. Project Scheduling
  - C. Materials Purchase
  - D. Pre-Design
  
15. Designing a building that has a flexible floor plan that could be used for commercial or residential purposes is an example of which of the following?
  - A. Brownfield
  - B. Heat Island
  - C. Adaptive Reuse
  - D. Shifting Abilities
  
16. GBI certification was developed by what organization?
  - A. Malaysia Green Building Council (MGBC)
  - B. Greenbuildingindex Sdn Bhd
  - C. Pertubuhan Akitek Malaysia (PAM) & Association of Consulting Engineers Malaysia (ACEM)
  - D. Malaysia Green Technology Corporation (MGTC)
  
17. Which of the following topics do MS1525 cover?
  - A. Proper Reuse of Materials
  - B. Rainwater Harvesting System
  - C. Energy Efficiency
  - D. Site Planning & Management
  
18. If you have completed all of the GBI prerequisites and earned 81 credits, what level of GBI certification have you earned?
  - A. Silver
  - B. Certified
  - C. Platinum
  - D. Gold
  
19. In a code-compliant building envelope, the most heat loss (per square foot) will occur through the
  - A. walls
  - B. windows
  - C. roof
  - D. floor
  
20. The heat loss per hour through infiltration can be as high or even higher than conductive heat loss through the entire building envelope?
  - A. True
  - B. False
  
21. Which of the following statements is **NOT** correct?
  - A. Higher R-values means better insulation
  - B. Thermal mass does not equate to better insulation
  - C. Heat loss increases with more severe outdoor temperatures
  - D. Higher U-factors mean better insulation

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22. Which of the following is **NOT** true concerning “cool roofs”?
- A. They typically exhibit a low Solar Reflectance Index (SRI)
  - B. They tend to emit heat at a high rate
  - C. They usually exhibit a high solar reflectance
  - D. They can help reduce the urban heat island effect
23. Which of the following terms can be described as the condition when a more conductive (i.e., poorly insulating) material permits an easier pathway for heat to flow across a thermal barrier?
- A. Solar heat gain coefficient
  - B. Heat capacity
  - C. Thermal bridge
  - D. Infiltration
24. When it comes to insulating a wall or a roof, after a certain point there is a diminishing return on increasing the total R-value.
- A. True
  - B. False
25. What is **NOT** one of the three basic forms of heat transfer in the built environment?
- A. Capacity
  - B. Convection
  - C. Conduction
  - D. Radiation
26. Which of the following is **NOT** a basic potential energy-related function of the building envelope?
- A. Solar energy collection or reflectance
  - B. Thermal energy storage
  - C. Reduction of heat transfer
  - D. Admission of light/views
  - E. Sound transmission
27. Which of the following building materials is the most thermally massive (i.e., exhibits the highest thermal storage capacity)?
- A. Brick
  - B. Concrete
  - C. Adobe
  - D. Gypsum
28. Carbon monoxide is a major contributor to air pollution in the United States. Which of the following is the biggest source of carbon monoxide?
- A. Factories and businesses
  - B. People breathing
  - C. Motor Vehicles
  - D. Trees

29. What is the most common cause of pollution of streams, rivers and oceans?
- A. Dumping of garbage by cities
  - B. Surface water running off yards, city streets, paved lots and farm fields
  - C. Trash washed into the ocean from beaches
  - D. Waste dumped by factories
30. Substitute a compact fluorescent light for a traditional bulb and you'll keep ... of CO<sub>2</sub> out of the atmosphere over the life of the bulb.
- A. 1 pound
  - B. 100 pounds
  - C. 1/2 ton
  - D. 1 ton
31. Compact fluorescents use ... less energy than a regular bulb.
- A. 60%
  - B. 70%
  - C. 80%
  - D. 90%
32. Green building means taking the environment into account during design and construction. Green buildings aim for harmony with the local environment: they benefit from it and protect and respect it. In general, green buildings are energy efficient, water conserving, durable and non-toxic, with high-quality spaces and high recycled content materials.
- A. True
  - B. False
33. In addition, green buildings generally have more comfortable indoor conditions, natural lighting, connections, and views to the outside and healthier indoor air. Because green buildings are healthier and more pleasant to be in, their occupants consistently show lower absenteeism, higher productivity, and, in schools, higher testing scores.
- A. True
  - B. False
34. Typical subdivision plans have a single building in the centre of open space on each lot. Clustered developments have larger open spaces and restricted building footprint areas.
- A. True
  - B. False
35. Reinforced concrete is a blend of water, cement, sand, and gravel (or "aggregate") poured or sprayed into formwork around steel reinforcing bars, where it cures and hardens.
- A. True
  - B. False

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36. ... is a by-product of coal-burning power plants that has binding properties similar to cement and can be substituted for a large portion of the cement usually used to make concrete.
- A. Fly ash
  - B. Gravel
  - C. Sandstone
  - D. Black powder
37. Reclaimed lumber is wood that was used in structures that have fallen out of use, such as old barns or railroad trestles. Salvaged wood also refers to previously cut and used wood, reclaimed by a salvage yard rather than a lumber company.
- A. True
  - B. False
38. ... are designed to reflect the heat that comes with the sunshine. They can be bright white membrane roofs, paint-on coatings (for retrofit applications), or light-coloured or specially designed tiles and shingles.
- A. Cool roofs
  - B. Green roofs
39. Metal roofs reduce heat gains inside and protect your roof's waterproofing layers, adding great durability. They prevent stormwater runoff. They can even replace habitat for species that is lost under the footprint of new construction. Many can be used as beautiful outdoor garden spaces for building occupants.
- A. True
  - B. False
40. Typical decking is made of durable wood that is endangered – particularly hardwood – and that is generally not sustainably harvested. Plastic lumber (which contains recycled high-density polyethylene, not PVC) and plastic-wood hybrid lumber are more sustainable substitutes for decking.
- A. True
  - B. False
41. Air leakage or infiltration in building terms, is a major source of unwanted heat gain in summer and heat loss in winter. Window and door frames or openings are the most common major locations of air leakage.
- A. True
  - B. False
42. Black water refers to wastewater from sinks, showers, and laundry – in distinction to Gray water from toilets and urinals.
- A. True
  - B. False
43. A Building Energy Management System (BEMS) is a computer that controls all major building equipment such as heating, ventilating, and air conditioning (HVAC) units, elevators, lighting, etc.
- A. True
  - B. False

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44. Why should people be concerned about sustainable transportation?
- A. For the environment
  - B. To save money
  - C. To promote energy independence and efficiency
  - D. For human health reasons
  - E. All of the above
45. What is the primary greenhouse gas emitted by burning the fuels we most commonly use in our vehicles?
- A. Carbon Monoxide
  - B. Carbon Dioxide
  - C. Sulphur Oxide
  - D. Methane
46. Which mode of transportation has the lowest environmental impact?
- A. A personal vehicle
  - B. A city buses
  - C. An airplane
  - D. A bicycle
47. What does the term 'finite' mean?
- A. Building materials made from wood
  - B. An infinite amount of resources
  - C. A limited amount of resources
  - D. Recycled resources
48. Which one of the following natural resources is plastic made from?
- A. Oil
  - B. Coal
  - C. Petrol
  - D. Gas
49. Why is it more sustainable to build using locally sourced construction materials?
- A. Because timber-based materials usually come from a managed source locally
  - B. They're cheaper locally
  - C. Less carbon emissions are produced, therefore better for the environment
  - D. The materials are transported with eco lorries
50. Why is it best to use 'brown field' building sites, rather than 'green field' sites?
- A. To protect the bats
  - B. Green field sites may be contaminated
  - C. They're cheaper to build on
  - D. To protect the natural environment
51. Why is it important to have a good waste management system on a construction site?
- A. It saves time
  - B. To reduce the amount of waste that goes to landfill
  - C. It increases the construction costs
  - D. So that all the waste can be incinerated

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52. A 'green field' site has ...
- A. A great view of the countryside
  - B. Has been built on previously
  - C. Never previously been built on
  - D. No existing buildings on it
53. What's the benefit of using a 'Brown field' site?
- A. Regeneration of waste land
  - B. All the waste materials can be buried on the site, therefore reducing the building cost
  - C. It's easier to construct on
  - D. It reduces the amount of carbon used during the building process
54. Using all of the earth's finite resources means that ...
- A. Petrol will be cheaper
  - B. We'll all have to use electric cars
  - C. There will be global shortages for future generations
  - D. There will be climate change
55. What does cradle to cradle refer to in a construction project?
- A. How a facility is operated over a specific period
  - B. The environmental impact of a project from the beginning to the end of its life cycle
  - C. The process of construction of built facilities
  - D. The demolition process of built facilities at the end of project life
56. These are the elements of sustainable design except
- A. Building orientation
  - B. Better wages
  - C. Water efficient
  - D. HVAC systems
  - E. Building envelope
57. Which pillar of sustainability refers to the below benefits of sustainable design?
- *Fewer landfills, greater markets for environmentally preferable products, decrease traffic due to the use of local materials*
  - *Improved occupants' productivity, satisfaction, health and safety*
  - *Improved comfort conditions for occupants, reduce adverse health impacts, improved occupant comfort and satisfaction, better individual productivity*
- A. Economy
  - B. Environment
  - C. Social
  - D. Political

58. "How do I get my project built?"

The above question refers to one of the principles of sustainable construction which is ...

- A. Health & Safety
  - B. Material selection
  - C. Procurement
  - D. Construction lifecycle
59. Which of the following issues can be minimized through the implementation of green building?
- A. Energy use
  - B. CO<sub>2</sub> emission
  - C. Water use
  - D. Solid waste
  - E. All of the above
60. What are the elements that couldn't be modified in value engineering?
- A. Process
  - B. Material
  - C. Design
  - D. Life span
61. Which of the following is **NOT** important in the concept of lean construction?
- A. Waste minimization
  - B. Alignment of the supply chain management
  - C. Coordination among project parties
  - D. Workflow of construction activities
  - E. Use of foreign workers
62. Sustainable Development is that development that satisfies the need of:
- A. Present generation only
  - B. future generation only
  - C. both (A) & (B)
  - D. none of these
63. Which of the following is a necessary condition for sustainable development?
- A. Increase in the quality of life
  - B. Reduction in the level of pollution
  - C. Conservation of stock of natural capital
  - D. All of the above
64. Which of the following is **NOT** considered as an element of the environment?
- A. Air
  - B. Land
  - C. Weather
  - D. Electricity

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65. Which of the following is a reason for noise pollution?  
A. Domestic sewerage  
B. Industrial waste  
C. Industrial machines  
D. Emission of gases
66. Non-Renewable resources are those resources which:  
A. are exhausted after use  
B. are not exhausted after use  
C. have an unlimited supply  
D. none of these
67. Which of the following is a cause of environmental degradation?  
A. Population explosion  
B. Increasing urbanization  
C. Rapid industrialization  
D. All of these
68. Where was the Earth Summit held in 1992?  
A. Delhi  
B. Tokyo  
C. Rio de Janeiro  
D. New York
69. Which layer in the atmosphere presents passing ultraviolet rays through it?  
A. Troposphere  
B. Stratosphere  
C. Ionosphere  
D. Ozonosphere
70. When was the concept of Sustainable Development introduced by the World Commission on Environment and Development?  
A. 1983  
B. 1985  
C. 1989  
D. 1987
71. Ozone depletion is due to  
A. Increase in greenhouse gas concentrations  
B. Deforestation  
C. High levels of chlorine and bromine compounds in the stratosphere  
D. Land degradation
72. When the surface soil is washed away through excessive rains and floods, it is called ...  
A. Soil erosion  
B. Land degradation  
C. Biodiversity  
D. Deforestation

73. Which global action plan was adopted in the Earth Summit of 1992?
- A. Agenda 21
  - B. Agenda 2030
  - C. Environment Protection Plan
  - D. None
74. A roof heating up from the sun's heat is an example of
- A. Conduction
  - B. Transition
  - C. Radiation
  - D. Convection
75. What are some ways to better insulate a home?
- A. Use aluminium foil as insulation
  - B. Replace a roof sheet with a solar panel
  - C. Add layers of insulation to the walls.
  - D. Remove trees and replace grass with concrete
76. Heat entering or leaving a home through cracks around doors, windows, and walls is an example of ...
- A. Radiation
  - B. Convection
  - C. Conduction
  - D. Transition
77. Conductors allow heat energy to easily pass through them.
- A. True
  - B. False
78. During the winter, a home gets cold because
- A. cold air from the outside comes into the warm home.
  - B. heat moves from inside the home to the cooler air outside.
  - C. there is thick snow around the wall.
  - D. a cold soil below the house
79. Which materials below are better insulators?
- A. Wood
  - B. Copper
  - C. Steel
  - D. Glass
80. The roof of your apartment heats up and transfers (or moves) heat to the walls of your apartment. This is an example of ...
- A. Convection
  - B. Radiation
  - C. Conduction
  - D. Insulation

81. During the summer, why does your home heat up?  
A. Heat transfers from the inside of your home to the outdoors where it is warmer.  
B. Heat transfers from the outside of your home to the inside of your home where it is cooler.
82. Some matter does **NOT** have thermal/heat energy.  
A. True  
B. False
83. Trees can make your home cooler during the summer because ...  
A. They are pretty.  
B. They block the sun's heat from reaching your home.  
C. They keep the air moving around your home.  
D. They absorb Carbon Dioxide and release Oxygen.
84. What are **NOT** the criteria of green technology  
A. Minimizes degradation to the environment  
B. Safe for use and promotes healthy  
C. Promotes the use of non-renewable resources  
D. Conserves the use of energy and natural resources
85. Which of the following is the thrust in National Green Technology?  
A. Intensify GT Product and Material  
B. Provide conducive GHG For GT Development  
C. Intensify Building Capital Development In GT  
D. Strengthen the Institutional Frameworks
86. Which of the following is **NOT** a challenge in implementing green technology  
A. Management Barriers  
B. Financial Barriers  
C. Knowledge Barriers  
D. Attitude Barriers
87. Green Contractor Accreditation is:  
A. ISO 9001 Certification  
B. ISO 15001 Certification  
C. PKK EMS Certification  
D. CIDB EMS Certification
88. Incentive given for green achievement are  
A. Transportation Incentive  
B. Green Building Incentive  
C. Waste & water management Incentive  
D. Energy Discount

89. ... has taken a step forward in developing a green labelling mechanism for construction material
- A. JKR
  - B. RISM
  - C. CIDB
  - D. ISM
90. Which of the following is **NOT** a green labelling concept
- A. recyclable
  - B. maximum environmental impact
  - C. good indoor air quality
  - D. lowest amount energy consumption
91. Examples of biological hazards are listed below except
- A. Fungi
  - B. Bed bug
  - C. Mosquito
  - D. Stress
92. Indoor Air Quality is
- A. Quality of air outside buildings
  - B. Quality of air inside buildings
  - C. The air quality around us
  - D. The quality around us
93. Causes of Indoor Air Quality Problems are
- A. Has good ventilation system
  - B. Efficient air conditioning
  - C. Inadequate fresh air
  - D. The use of artificial lighting
94. Which of the following is to overcome the Indoor Air Quality Problem
- A. Use more air cleaners
  - B. Regular testing & maintenance of ventilation system
  - C. Install shading above windows
  - D. Do construction in the building
95. Which of the following is the purpose of Air Conditioning
- A. to provide & maintain a 'created' building environment
  - B. to supply air
  - C. to dilute contamination
  - D. to increase the moisture content
96. Which one is **NOT** the symptoms of Sick Building Syndromes?
- A. Runny nose
  - B. Sneezing
  - C. Dizziness
  - D. Cancer

97. An example of several minerals that are formed in long, thin fibres
- A. Smog
  - B. Asbestos
  - C. Radon
  - D. VOCs
98. Radon gas is most harmful to which part of the body?
- A. Eyes
  - B. Lungs
  - C. Heart
  - D. Kidneys
99. Which is **NOT** an example of a way to help prevent radon gas in homes?
- A. Sealing cracks
  - B. Ventilation
  - C. Plastic in the crawlspace
  - D. Air fresheners
100. Which of the following substances is a colourless, odourless, tasteless, radioactive gas?
- A. carbon monoxide
  - B. radon
  - C. ozone
  - D. asbestos
101. Carbon Monoxide can cause people to become drowsy and suffocate when it binds to ...
- A. haemoglobin.
  - B. white blood cells.
  - C. alveolar receptors.
  - D. retinal glial cells.
102. When a building has bad air quality, it has something called
- A. Sick Building Syndrome
  - B. Radon
  - C. Carbon Monoxide
  - D. Smog
103. Hydrocarbons such as gasoline, solvents, paints, fingernail polish & thinners vaporize easily.
- A. Sulphur Oxides
  - B. Nitrogen Oxides
  - C. VOC's
  - D. Mercury
104. VOC used in the manufacturing of furniture and building materials. Which one of the following is VOC?
- A. Formaldehyde
  - B. Kerosene
  - C. Carbon Monoxide
  - D. Radon

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105. What type of chemical is emitted from most manufactured building materials and furniture?
- A. Asbestos
  - B. Radon
  - C. Carbon Monoxide
  - D. Formaldehyde
106. What is the effect of Carbon Monoxide
- A. increases lung cancer rates
  - B. leads to the formation of photochemical smog
  - C. is most problematic in rural areas
  - D. is produced by incomplete combustion
107. Which outdoor air pollutant is also a significant indoor air pollutant?
- A. Sulphur Dioxide
  - B. Carbon Monoxide
  - C. Ozone
  - D. Lead
108. The primary source of radon is ...
- A. electronics
  - B. indoor fires
  - C. rocks and soils
  - D. household chemical fumes
109. Asbestos ...
- A. is used for insulation
  - B. can be easily removed and treated
  - C. can be a problem in new construction
  - D. causes skin irritation, nausea, and fatigue
110. What are the percentages of the earth's water?
- A. 50%
  - B. 60%
  - C. 71%
  - D. 80%
111. "Ensuring availability of water for future generations" is a
- A. Goal of water conservation
  - B. Strategy of water conservation
  - C. Key activity of water conservation
112. What is the water division of the earth
- A. ocean water – 97.5%, freshwater frozen as ice – 1.5% and freshwater – 1%
  - B. ocean water – 47%, freshwater – 50%, freshwater frozen as ice – 3%
  - C. ocean water – 1%, freshwater frozen as ice – 90%, freshwater – 9%
  - D. freshwater – 33.33%, freshwater frozen as ice – 33.33%, ocean water – 33.33%



113. What is the main cause of water pollution?
- A. invasive species
  - B. animals
  - C. plants and insects
  - D. human impact and decision making
114. Water that is stored in layers of rock and soil beneath the Earth's surface is called ...
- A. groundwater
  - B. sewage
  - C. a reservoir
  - D. an underground stream
115. Approximately 75 percent of the Earth's surface is covered in water. Why is water considered such a precious resource?
- A. The greenhouse effect is causing most of the world's freshwater to be trapped in the atmosphere
  - B. Only a small fraction of the Earth's water is freshwater available for drinking and irrigation
  - C. Each year, more freshwater is being trapped in icecaps located at the North and South Poles
  - D. Global warming caused by greenhouse gas emissions will likely cause Earth's oceans to evaporate
116. What usually uses more water in the home?
- A. washing machine
  - B. taking a shower
  - C. brushing your teeth
  - D. drinking water
117. What are the percentages of the earth's water is salt water?
- A. 3%
  - B. 25%
  - C. 71%
  - D. 96.5%
118. One-third of household watering is for outdoors. What are good irrigation practices for lawns or gardens?
- A. Avoid watering in the heat of the day so it doesn't evaporate
  - B. Don't water on windy or rainy days
  - C. Do not water lawns between 10 AM – 4 PM
  - D. All of the above
119. The most commonly used index for comparing energy use in buildings is the Building Energy Index (BEI). This is usually expressed as kWh/m<sup>2</sup>/year which measures the total energy used in a building for one year in kilowatts hours divided by the gross floor area of the building in square meters.
- A. True
  - B. False

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120. Sustainable materials are materials used throughout our consumer and industrial economy that can be produced in required volumes, but it depletes non-renewable resources and disrupts the established steady-state equilibrium of the environment and key natural resource systems.
- A. True
  - B. False

**– END OF QUESTIONS –**

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