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FACULTY OF HEALTH SCIENCES
DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCE



RESIT EXAMINATION

TITLE OF PAPER	ENVIRONMENTAL PHYSICS
COURSE CODE	EHS106
DURATION	2 HOURS
DATE	JULY 2018
TOTAL NUMBER OF MARKS	100
INSTRUCTIONS	<ol style="list-style-type: none">1. DO NOT OPEN THIS PAPER UNTIL YOU ARE INSTRUCTED TO DO SO.2. ANSWER QUESTION ONE AND ANY OTHER THREE QUESTIONS.3. BEGIN YOUR ANSWERS TO EACH QUESTION ON A FRESH PAGE. ENSURE THAT ALL ANSWER SHEETS ARE NUMBERED CORRECTLY.4. POOR HANDWRITING AND CARELESSNESS IN ENGLISH LANGUAGE GRAMMAR SHALL RESULT IN LOSS OF MARKS.5. ANY FORM OF MISCONDUCT DURING THE EXAMINATION IS PUNISHABLE IN LINE WITH RELEVANT ACADEMIC REGULATIONS.

QUESTION ONE [25 MARKS]

1. The use of walls and floors of concrete, adobe, brick, or stone, etc., to store much of the collected solar energy as heat is relevant in;
 - (a) Active solar systems
 - (b) Solar thermal systems
 - (c) Passive solar systems
 - (d) Hydropower
2. The orientation of dwellings to take advantage of the sun's heat and light, building of thick stone walls that collect and store heat during the day and gradually release it at night, the use of light colours on roofs is relevant in;
 - (a) Geothermal energy production
 - (b) Hydropower production
 - (c) Passive solar systems
 - (d) Active solar systems
3. Thermal solar systems;
 - (a) Transfer solar energy from one point to another
 - (b) Disperse solar energy
 - (c) Concentrate solar energy
 - (d) Are mainly used for domestic purposes
4. Desert areas are good places to generate solar energy using;
 - (a) Passive solar systems
 - (b) Active solar systems
 - (c) Concentrated solar systems
 - (d) Molten salt systems
5. In one of the solar systems, concentrated heat can be as high as 400°C. This is in;
 - (a) Passive solar systems
 - (b) Solar power tower
 - (c) Active solar systems
 - (d) Troughs of curved collectors
6. In solar energy production, one of the strategies that can be used to provide necessary heat even at night is;
 - (a) The use of concentrated solar systems
 - (b) The use of active solar systems
 - (c) The use of passive solar systems
 - (d) The use of molten salt
7. One of the solar systems that require the use of back-up systems is;
 - (a) Passive solar systems
 - (b) Concentrated solar systems
 - (c) Troughs of curved collectors
 - (d) All of the above
8. Shortage of water can limit the production of solar energy. This statement is relevant in;
 - (a) Passive solar systems
 - (b) Solar cookers
 - (c) All of the above systems
 - (d) The use of curved parabolic solar collectors

9. The use of computers in solar energy production is relevant in;
 - (a) Curved collector systems
 - (b) Central power tower
 - (c) Concentrated solar systems
 - (d) Photovoltaic cells
10. The use of kinetic energy of falling and flowing water is a key principle in;
 - (a) Solar concentrated systems
 - (b) Hydropower systems
 - (c) Soar-hydropower systems
 - (d) Geothermal systems
11. The world's leading renewable energy source used to produce electricity is;
 - (a) Solar systems
 - (b) Hydropower
 - (c) Nuclear power
 - (d) Coal
12. The use of anaerobic bacteria in liquid fuel production is a common practice in;
 - (a) Production of electricity from biomass
 - (b) Production of methane
 - (c) Production of biogas
 - (d) Production of synthetic oil
13. Biogas is a mixture of;
 - (a) 60% CH₄ and 40% CO₂
 - (b) Liquid ethanol and liquid methanol
 - (c) Wood alcohol and liquid ethanol
 - (d) 50% CH₄ and 50% CO₂
14. Gasohol is obtained by mixing;
 - (a) Gasoline and ethanol
 - (b) Ethanol and biogas
 - (c) Biogas and methanol
 - (d) Gasoline and diesel
15. Sugarcane residue that can be used to make ethanol is called;
 - (a) Bagasse
 - (b) Lagasse
 - (c) Tagasse
 - (d) Pagasse
16. In times of peak electrical demand, a power supply company may rely on;
 - (a) A pumped storage hydropower system
 - (b) A large-scale hydropower system
 - (c) A geothermal power system
 - (d) A power tower system
17. Solar thermal systems collect and transform radiant energy from the sun into high-temperature thermal energy. One of these systems uses;
 - (a) Meteors
 - (b) Heliostats
 - (c) Peleostats
 - (d) Passive heliostats

18. The biggest producer of hydropower electricity is;
 - (a) Japan
 - (b) Russia
 - (c) China
 - (d) Brazil
19. Production of hydropower is possible without the use of reservoirs. This can be achieved by the use of;
 - (a) Curved collector systems
 - (b) Dam walls
 - (c) Biogas digesters
 - (d) Microhydropower generators
20. The use of steam and CO₂ in oil extraction is common in;
 - (a) Primary oil recovery
 - (b) Secondary oil recovery
 - (c) Net oil extraction
 - (d) Enhanced oil recovery
21. One source of liquid biofuels that can be produced without affecting food prices is;
 - (a) Snodgrass
 - (b) Corn
 - (c) Switchgrass
 - (d) Soybeans
22. The fermentation of sugar and grain crops (such as sugarcane, sugar beets, sorghum, sunflowers and coin) would result in;
 - (a) Methanol
 - (b) Ethanol
 - (c) Gasohol
 - (d) Biogas
23. Salmon usually move to upstream areas to reproduce. Hydroelectric dams, which are built across rivers, are particularly a problem because;
 - (a) Dams eliminate current
 - (b) The advancing fish often come against cold water, and so they are forced to return to sea.
 - (c) Dams are so deep and so most pregnant fish often struggle to swim past such deep water
 - (d) Fish cannot see anything, since in deep water light cannot reach to lower levels, so fish lose their way.
24. One of the most important factors that affect the longevity of hydroelectric dams is;
 - (a) Global climate change
 - (b) Sediment
 - (c) Ever increasing demands for power
 - (d) Seismic activity
25. One of the greatest challenges facing solar energy is;
 - (a) Conversion from alternating current to direct current
 - (b) The disposal of used batteries which contain plutonium
 - (c) Intermittency
 - (d) Unaffordable costs

QUESTION TWO [25 MARKS]

1. Discuss, in not more than three points for each, the impacts of metal extraction under the following themes;
(a) Land subsidence [4].
(b) Mine fires [4].
2. In an attempt to slow the depletion of mineral resources, conservation has been suggested as one technique that can be adopted. With the aid of two examples, explain what is meant by conservation [2].
3. What are the five factors that determine the availability of oil that can be extracted profitably? [5]
4. State any five examples of biomass [5].
5. Describe the four main findings of Sherwood Rowland and Mario Molina's ground-breaking research that led to a call for an immediate ban of chlorofluorocarbons (CFCs) in spray cans [5]

QUESTION THREE [25 MARKS]

1. State any five human activities that have led to increased emissions of methane gas to the atmosphere [5].
2. Because of the second law of thermodynamics, the use of carbon-containing fossil fuels packs a double punch (meaning a two-fold problem). What do you understand by this statement [5]
3. Some of the main greenhouse gases include CH₄, CO₂, H₂O and N₂O. Arrange these gases in order of their residence times in the troposphere (from the longest to the shortest atmospheric lifetime) [2].
4. State any four natural sources of CO₂ [4].
5. Hydropower production does not contribute to greenhouse emissions because water is only released to turn turbines. However, in some ways, hydropower projects are known to contribute to large releases of CO₂ and CH₄. Describe your understanding of these processes [2].
6. Describe how projected climate change is likely to reduce the electrical output of many of the world's large dams in cold climates [2].
7. The burning animal manure is common where wood and other fuels are in short supply. Using examples, describe the effect of this practice on food supply? [5]

QUESTION FOUR [25 MARKS]

1. One of the disadvantages of wind turbines is the killing of birds. However, there are ways of reducing these impacts. Describe any two such measures [6].
2. Wood is a renewable resource, but it can also be a non-renewable resource. Explain how this is possible [2].
3. What do you understand by the following statement: "there is no net CO₂ increase in burning biomass" [2]
4. State any three examples of agricultural wastes that can be burned to generate electricity or converted to biofuels [3]
5. Briefly describe the main difference between large-scale hydropower projects and small-scale hydropower projects [2].
6. Although the generation of electricity in hydropower plants is not associated with high CO₂ emissions, hydropower infrastructure can lead to production of more greenhouse gases than coal-fired power plants. Explain how this might happen [3]
7. In the absence of the protective ozone layer, state any four diseases/health problems that could be experienced by humans on earth [4].
8. State any three examples of wet deposition [3]

QUESTION FIVE [25 MARKS]

1. As a result of two scientific laws, individual use of matter and energy resources automatically adds some waste heat and waste matter to the environment. State the two laws in full [5].
2. According to the two scientific laws you have stated above, what is the impact of the continued use of matter and energy resources on planetary sinks? [5]
3. State any five solutions that can be adopted to control environmental problems caused by matter and energy resource use [5].
4. State any five industrial uses of oil [5].
5. State any five mining techniques that are used to extract mineral resources and/or energy resources from the earth's crust [5]