

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

B.Tech degree examinations (S), September 2020 (S1/S2 - 2015 Scheme)

**Course Code: BE103****Course Name: INTRODUCTION TO SUSTAINABLE ENGINEERING**

Max. Marks: 100

Duration: 3 Hours

**PART A***Answer all questions, each set carries 5 marks.*

Marks

- |           |                                                                                                                                                                         |     |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 1         | a1) What are the salient features of Water (Prevention and Control of Pollution) Act, 1974?                                                                             | (2) |
|           | a2) What are the essential components of sustainability?                                                                                                                | (3) |
| <b>OR</b> |                                                                                                                                                                         |     |
|           | b1) Explain the link between Science and Technology and sustainable development, citing relevant examples.                                                              | (5) |
| 2         | a1) Explain any one method adopted for sustainable treatment of wastewater.                                                                                             | (2) |
|           | a2) Densely populated areas are suffering major issues in the field of solid waste and waste management. Relate this statement with the current situation in our state. | (3) |
| <b>OR</b> |                                                                                                                                                                         |     |
|           | b1) Define e-waste. Enumerate on the management of e-waste.                                                                                                             | (5) |
| 3         | a1) What is Environmental Impact Assessment (EIA)?                                                                                                                      | (2) |
|           | a2) What are the standard procedures of EIA in India?                                                                                                                   | (3) |
| <b>OR</b> |                                                                                                                                                                         |     |
|           | b1) What is PDCA cycle? What are the benefits of EMS?                                                                                                                   | (5) |
| 4         | a1) Emphasize the role of 'less energy building materials' in a green building.                                                                                         | (2) |
|           | a2) What are the main characteristics of Sustainable cities?                                                                                                            | (3) |
| <b>OR</b> |                                                                                                                                                                         |     |
|           | b1) List any 5 criteria of 'GRIHA' rating system.                                                                                                                       | (5) |
| 5         | a1) Propose the different solar energy technology that can be installed in your college.                                                                                | (2) |
|           | a2) Describe how those technologies will help to reduce the carbon footprint of the college.                                                                            | (3) |
| <b>OR</b> |                                                                                                                                                                         |     |
|           | b1) List out the advantages and disadvantages of conventional sources of energy.                                                                                        | (5) |

- 6 a1) “Availability of fresh water is the biggest crisis facing the world today” (2)  
Comment.
- a2) Critically analyse the role of renewable energy in the Kerala Context. (3)

**OR**

- b1) What are the prospects of using Biofuel as a renewable energy source? (5)
- 7 a1) Explain the concept of smart city with an example. (2)
- a2) How a smart city helps in sustainable development? (3)

**OR**

- b1) With a suitable industrial example, explain what you understood on industrial symbiosis. (5)
- 8 a1) How did industrialization change the way of human life in context to a developing country like India? (2)
- a2) What is the nexus between industrialisation and environmental degradation? (3)

**OR**

- b1) How to develop sustainable urbanization? (5)

**PART B**

*(Read the Stories/Cases/Data set as the case may be, and answer all questions, each full question carries 10 marks.)*

**Stories/Cases/Data set - 1**

(Stories/Cases/Data set)

In 2013, severe floods affected the North Indian state of Utharakhand, due to unusually high rainfall during the monsoon season caused devastating floods and landslides. Over 3 lakhs of pilgrims and tourists trapped in the valleys and had to be evacuated. Almost all districts of the state were placed on affected. Severe landslides have left the hilly districts isolated.

**Module 1**

- 9 a) Relate the scenario given, with sustainability? (3)
- b) Give any two instance of over-exploitation of natural resources that worsened the impact of monsoon in the state of Kerala. (3)
- c) List out the impacts caused by flood. (4)

**Stories/Cases/Data set - 2**

(Stories/Cases/Data set)

Climate Change is a term discussed in today’s world by scientists, government agencies and even the common man. UN Climate Summit in Paris highlighted the impacts of global warming unevenly with the world’s poor and unprepared, to deal with the climate shocks such as rising sea or severe draught. The poor have fewer resources and receive less support from family, community and financial system and social safety nets to prevent cope and adapt. Over 100 million people will be pushed into extreme poverty by 2030 by disrupting agriculture and fuelling the spread of Malaria and other diseases, says the world bank report.

**Module 1I**

- 10 a) Enumerate the impact of Global warming on rise of sea levels (3)

- b) In your opinion is there a phenomenon called climate change? Substantiate your answer (3)
- c) What are the recent incidences that you have experienced by which you can state that there is climate change? (4)

**Stories/Cases/Data set - 3**

(Stories/Cases/Data set)

The US Department of Energy has developed an LCA report to help evaluate the energy and environmental benefits of LEDs when compared to incandescent and fluorescent lighting. This analysis follows the four steps outlined above. When using LCA to compare equipment, it is important to establish a common unit of performance by which each will be judged. For lighting, the useful life of the three alternatives below varies greatly. When comparing the total environmental impact of LEDs with incandescent, one must remember the frequent replacement needs of the latter. Though the manufacturing of LEDs may have a greater environmental impact than its competition, the dominant source of impact is the lifetime energy use. 1LED lamp, is equivalent to 3 CFL or 22 incandescent lamps. Today's LEDs are roughly equivalent to CFLs with respect to LCA. If the technology continues to advance as expected, the LED should have the clear advantage with respect to total environmental impact.

**Module 1II**

- 11 a) What is LCA? (3)
- b) Explain how LEDs can have advantage with respect to total environmental impact. (3)
- c) Prepare the LCA for LED lamps. Discuss the importance of LCA in above report. (4)

**Stories/Cases/Data set - 4**

(Stories/Cases/Data set)

Kochi Water Metro is an integrated water transport project in Greater Kochi region proposed by Kochi Metro Rail Limited. It will be developed as a feeder service to the Kochi Metro rail. The water metro is expected to start operations on 14 April 2019. Apart from ferry service, the project also contemplates development of the new and existing access roads to jetties and islands. During the phase I of this project, it is proposed to operate 7 routes with a fleet requirement of 43 boats and 16 out of the 38 jetties will be developed and will be completed by 2018. The total cost of the Water Metro project is Rs 820 crore.

**Module IV**

- 12 a) List any 3 social sustainability aspects of the project. (3 \* 1 = 3 marks) (3)
- b) How this high budget project provides a sustainable transport system? (3)
- c) Design an integrated sustainable transportation system suitable for Kerala (4)

**Stories/Cases/Data set - 5**

(Stories/Cases/Data set)

In the history of Kerala state, 35 of its 54 dams had been opened since the water level had risen close to overflow level due to the heavy rainfall, flooding local low-lying areas. The flooding has affected hundreds of villages, destroyed an estimated 10,000 km of roads and thousands of homes have been damaged or destroyed. According to government records more than 10,000

animals have died due to the flooding. The heavy rainfall in a short space of time also triggered landslides that killed many people. Environmentalists say deforestation is responsible for this. Some parts of Kerala have been marooned because wetlands and lakes that acted as natural safeguards against floods have disappeared because of rampant urbanisation and construction of infrastructure. But experts say the havoc that floods have wreaked in Kerala this time has added another dimension to the disaster: danger from dams. If things are not well managed and if rains continue to be erratic, as predicted by climate change scientists, a disaster of this scale is likely to occur more often than once in a century.

#### Module V

- 13 a) (5)  
If dams pose a great threat, what are the alternative energy sources for a small coastal state like Kerala?
- b) (5)  
Do you prefer tidal energy over solar power as an alternative source of energy for a coastal state like Kerala? Give reasons for your answer.

#### Stories/Cases/Data set - 6

(Stories/Cases/Data set)

India is a developing nation. Modernization has led to the development in the lifestyle and the basic needs are no more just food, cloth and shelter. The industrialization has led to development in diverse areas like agriculture, manufacturing sector, coal, timber, bottling plants, automobiles, gas and chemicals. This has definitely developed the economy of India and the lifestyle of people living in the country. It had also led to the degradation of environment and the environmental conditions, the flora and fauna in different ecosystems, extinction of the rare species of animals, plants and birds and the depletion of natural resources. The major cause of this is the deforestation of the ecosystems for industrialization. Industrialization has resulted in the increase in the emission of harmful effluents and pollutants both into water, soil and air. These effluents have caused a severe and irreversible destruction to the different species residing in those specific ecosystems

#### Module VI

- 14 a) (5)  
With the help of a real time example, explain how industrialisation has led to the degradation of environment in India.
- b) (5)  
Suggest any two methods to reduce environmental impact due to industrialisation.

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