

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**FIRST SEMESTER B.TECH DEGREE EXAMINATION DEC 2015**  
**BE 103 INTRODUCTION TO SUSTAINABLE ENGINEERING**

**Maximum Marks: 100, Duration of Exam: 3 Hrs.**

**Part A**

**(Answer ALL Questions).**

- Q. A1. (a) i) Illustrate the three pillar model of sustainability. (2 marks)
- ii) Comment on the challenges for sustainable development in our country and suggest a way to overcome the same. (3 marks)

OR

- (b) i) Enumerate the major indentations of the Air Act. (3 marks)
- ii) What is the main motto of the Clean Development Mechanism (CDM)? Relate the same to the suggestions of Kyoto protocol. (2 marks)

Q. A2. a. Densely populated areas are suffering major issues in the field of solid waste and waste water management.

- i. Relate this statement with the current situation in our state. (2)
- ii. Suggest any three sustainable methods each for the solid waste and waste water management system. (3)

OR

- b. Explain the significance of carbon footprint. Suggest some methods for reducing the carbon footprint of your house.

Q. A3. a. Life cycle assessment takes the concept of “cradle to grave”. Explain this with any example.

OR

- b. A hospital is situated in the middle of a densely populated area. What are the possible environmental impacts that can happen to the surroundings? Suggest any methods for reducing these impacts.

Q. A4. a. Take an example of green building. How it differs from a conventional building. Compare in any six aspects.

OR

- b. A new commercial building is constructing in your city. Suggest some methods to the builder for getting a four star GRIHA rated building.

Q. A5. a. Differentiate between conventional and non conventional energy sources. Which will you support? Why?

OR

- b. In future, the sources of fossil fuels become rare and extinct. Suggest some methods to overcome this crisis.

Q. A6. (a). With the help of a sketch, explain the working of a solar photovoltaic system.

OR

(b). “We can create a more Sustainable, cleaner and safer world by making wiser energy choices.” Evaluate the importance of the quote and discuss on the various Non-Conventional Energy Sources.

Q. A7. a. Slum formation is the major threat for urbanization. Discuss the reasons behind slum formation and the issues caused by slum in urban areas.

OR

b. Transportation sector is the major source of pollution in the cities. What are the factors pointing to this statement? Suggest some methods to deal with traffic issues in urban areas.

Q. A8. a. Industrialization was the major turning point in the history. How did industrialization change the way of human life?

OR

b. Engineering practices and technology can help to move the product, processes and systems developed by society towards sustainability. Substantiate this statement.

**(Total 8 x 5 = 40 Marks)**

### **Part B**

**(Read the Stories/Cases/Data set as the case may be, and answer ALL questions. Each FULL question carries 10 Marks.)**

#### **Sample Story/Case 1**

Air pollution in Asia has worsened since 2000 and is responsible for deaths of thousands of people in Beijing, Jakarta, Seoul and Manila. The pollution is a result of the use of fossil fuels by the industry and transport sectors. The problem got aggravated in Asia due to the use of poor quality fuel, inefficient method of energy production, use of vehicles in poor condition and traffic congestion. This was revealed during a research conducted by World Bank and Stockholm Development Institute. The research states that air pollution in the continent has surpassed the combined emissions in Europe and North America. The deaths caused by fine particulate matter far exceed those caused by sulphur dioxide, nitrogen oxide, ozone and lead. The health cost in major Asian cities now exceed for 15-18 percent of urban income expenditure, claims World Bank officials.

#### **Module 1**

QB1. (a). Identify any one component that need to be addressed towards attaining social, economic and environmental sustainability in the case illustrated.

(1+1+1)

(b). Compare the given situation in the cities stated in the text with any major Indian city. Do you see any such catastrophe to happen/is happening here? Why?

(1+2)

(c). Which multilateral environmental agreement(s) in the past think was proposed to curb the growing impact of pollution on humanity specific to the nations discussed here? Also highlight the instrument of action that is applicable in this context.

(1+1)

(d). A project under Clean Development Mechanism is to be proposed to contain the growing air pollution in the countries discussed, at the same time tackling a development initiative. Could you propose a CDM initiative that might be used in all the regions discussed here? Focus your answer showing the impact on the populace and the activity.

(2)

## Module 2

Q. B2 (a). A comprehensive campaign to address air pollution need to be launched through school children, what programme would you envisage for this. What is outcome anticipated? (3)

(b). There is a sudden decision to remove all vehicles from the road that fails to meet specified norms of emission level within a specified time period. As part of citizen forum you are requested to give views on the enforced regulation. State your views on this.

(3)

(c) A massive campaign on environmental degradation is to be initiated. Bring out a slogan and the key message that need to be addressed.

(2)

(d). Suppose you are a Carbon Credit Auditor appointed to assess the greenhouse gas emission reduction strategies. Identify a component of assessment and brief the methodology that could be adopted in connection with this.

(2)

## Sample Case 2

### Case on Ecological Habitat Development

The project on ecological housing in Setagaya-Ku Fukasawa Tokyo, Japan provided environmentally sustainable housing in one of the most densest cities of the world with the normal public housing cost financed totally from public funds. Five apartment buildings were constructed with 70 dwellings, 43 of which were for low income residents. High levels of

thermal insulation and technologies saving energy such as solar collector for heating and hot water, solar cells and wind turbines were attached and water saving techniques such as permeable pavement and rainwater collection were installed. Various passive lighting, heating and cooling methods were applied and the design was made according to local wind patterns to enable natural ventilation during hot and humid summers. The building materials were selected to have minimal impacts on the environment and health of residents. Many trees were preserved and moved to the site, a garden established, a green rooftops installed, which is important in the context of low urban greenery and a major heat island effect. Thirty percent saving of average household energy bills were achieved. Shared community facilities were constructed. The project had a social dimension resulting in a social mix that is very rare in Tokyo.

### **Module III**

Q. B3. (a). Highlight the significance of life cycle cost evaluation when applied to such projects to establish the advantage of environmentally sustainable housing projects. (3)

(b). If you are asked to evaluate the environmental impact of the above project, state any two factors that can be identified as the key impacts on the environment. Also specify the necessary information required for the assessment of impact due to these factors. (4)

(c). If standardisation of these practices need to be attained how can ISO 14000 help the organisations to ensure quality of practice in environmentally sustainable housing projects? (3)

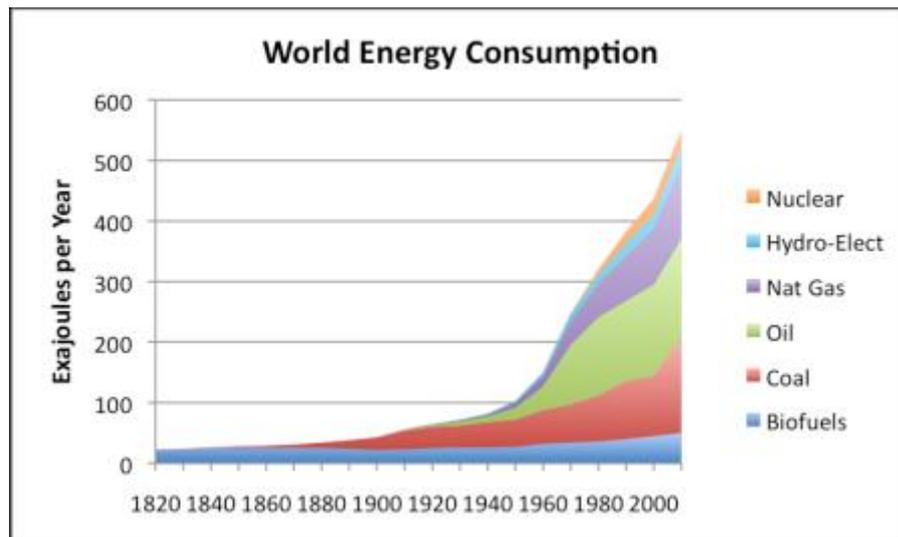
### **Module IV**

Q. B4. (a). Identify any three interventions made in the given project (case 2) to ensure energy efficient construction practice. (3)

(b). The project had also initiated large number of green buildings practices. Mention any two cases followed to make the practice green and also justify your claim appropriately (2+2)

(c). The project have tried to address social, environmental and economical dimension of habitat development. Identify any one step taken by the implementing agency to address each of the three parameters and also state how you would see these steps from Kerala perspective. (3)

### Sample Case/Data 3



### Module V

- Q. B5. (a). The energy use policies have had serious impact on sustainability. Justify the statement based on the energy use pattern across the century (1900 to 2000) (3)
- (b). If the trend shown in this is expected to continue sketch a simple graph to estimate the energy use by the year 2050. (3)
- (c). Among the different energy sources shown in the figure which one was the most recent to supply to energy needed for development? How do you see the potential of this energy source for future? Provide appropriate justification for your answer. (4)

(Another typical evaluation-level question that may be asked based on the given case, in Module V is as follows:

The biomass energy supply doesn't show a significant change in consumptive rate. What according to you could be a reason for this situation? )

### Module VI

- Q. B6. (a). If industrial energy use is the dominant consumer of energy. Give any three suggestions for reducing the energy consumption in industries. (3)
- (b). Give a short account of pollution faced due to the prevailing practice of growth represented in the figure. (3)

(c). If the given graph represent the blueprint of prevailing energy use, What suggestions would you propose to reduce the conventional energy use by 25 %. State any two steps initiated and how they are used to attain the anticipated reduction levels. (4)

(Another sample question related to case 3, and in Module VI, may be as follows:

Q. Going green can reduce the overall energy use. Mention any one strategy that you could adopt to meet the sustainability benchmarks).