# Centre for Energy Studies
## Indian Institute of Technology Delhi
### ESL 750: Economics and Planning of Energy Systems

Time: One Hour    Minor Test - II (2016-2017 batch)    Maximum Marks: 15

Note: Please answer all questions. The marks assigned to each question are indicated within square brackets at the end of the question.

1. Explain why (any TWO)
   (a) Input-output table based analysis does not consider economy of scale in productive processes?
   (b) Money has a time value?
   (c) Deciding the spacing between risers of a flat plate solar collector may involve economic considerations?
   (d) Scarcity Rent may be included while pricing fossil fuels? [2]

2. Write mathematical expressions that can be used for determining each of the following and define the parameters used. (any TWO)
   (a) Equivalent uniform annual value of a one-time capital investment during the useful life of a project
   (b) Equivalent uniform annual cost of replacing a battery bank after every five years
   (c) Equivalent cumulative present worth of uniform annual monetary savings likely to accrue to the user of a solar water heating system [3]

3. For the distribution of the output (in some pre-defined monetary units) of a 4-sector input-output table given below, write the corresponding input-output coefficient matrix

   |  | Sector 1 | Sector 2 | Sector 3 | Sector 4 | Final Demand |
   |---|---|---|---|---|---|
   | Sector 1 | 100 | 200 | 300 | 400 | 1000 |
   | Sector 2 | 400 | 300 | 200 | 100 | 1500 |
   | Sector 3 | 50 | 50 | 0 | 400 | 500 |
   | Sector 4 | 250 | 150 | 100 | 200 | 1300 |

   [3]

4. Define Central Limit Theorem and explain its relevance

   **OR**

   Explain the difference(s) between Z-test and t-test

   **OR**

   Discuss important characteristics of Least Square Regression Approach [3]

5. Write the name of the demand forecasting approach that could be used in each of the following cases (any FOUR)
   (a) Forecast to be made in a short period of time
   (b) Only the past consumption data is available
   (c) Effect of an envisaged growth rate in GDP on the energy demand is to be studied
   (d) Impact of likely improvement in efficiencies of energy extraction, conversion and utilization processes on energy demand is to be studied
   (e) Contribution of inter-sectoral consumption on energy demand is to be internalized in demand forecasting
   (f) Impact of various causal factors on energy demand is to be studied [2]

6. Comment on the variation of the marginal cost of producing electricity with an increase in cumulative installed capacity of a renewable energy technology as given in the following table

   | Installed Capacity (GW) | 0.01 | 0.5 | 3 | 10 | 20 | 30 | 40 | 80 | 150 | 250 | 400 | 600 | 1000 | 4000 |
   |---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
   | Marginal Cost (Rupees/kWh) | 45 | 36 | 24 | 20 | 18 | 16 | 14 | 12 | 10 | 7 | 5 | 5 | 5 | 6 |

   [2]