

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

Time: One Hour

Minor Test - I (2018-2019 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. In case any additional information is required to solve the numerical question(s), please make suitable assumption(s) and mention the same explicitly in your answer to the question(s). Self Learning Component of Minor-I is being given separately.

1. Explain why (Please answer any TWO only)
 - (a) Energy GDP Elasticity of a country should be as small as possible?
 - (b) Use of physical control or pricing as policy instruments should be resorted with utmost care?
 - (c) Future energy demand should be forecasted much in advance with best possible accuracy?
 - (d) Independent parameters of an econometric model for energy demand forecasting must be carefully identified?
 - (e) Substitution of coal by natural gas to meet a certain amount of useful energy demanded by an industry is expected to lower the amount of carbon dioxide emissions released by the industry? [2]
2. Explain the difference(s) between (Please answer any TWO only)
 - (a) Delphi Method and Panel Consensus Approach for Qualitative Analysis of Energy Demand
 - (b) Proven Reserves and Total Reserves
 - (c) Inter-fuel Substitution and Inter-factor Substitution
 - (d) Inferior and Superior Fuels [2]
3. A household with annual income of Rs. 5,00,000 consumes 200 kg of LPG annually for domestic use while the price of LPG is Rs. 70 per kg. (Please answer any TWO only):
 - (a) If the Price Elasticity of Demand for LPG consumption by the household is estimated at 1.6, determine the expected annual LPG consumption by the household if the price of LPG is increased to Rs. 73.50 per kg. [2]
 - (b) If the Income Elasticity of Demand for LPG consumption by the household is estimated at 0.15, determine the expected annual LPG consumption of the household with its annual income increasing to Rs. 6,00,000. [2]
 - (c) The Cross Elasticity of LPG demand of the household with respect to the price of electricity for the household is 0.2. Determine the percentage change in LPG demand if the price of electricity increases by 15%. [2]
4. From the surveys of fuel-wood price in 36 different suburban areas of India, the mean fuel-wood price is estimated at Rs.2.40 per kg with a standard deviation of Rs. 0. 60 per kg. Estimate the 95% confidence interval for the fuel-wood price in the suburban areas of the country if the fuel-wood price is expected to be normally distributed. For the area under each side of the normal distribution curve to be 0.475, the corresponding Z value is 1.96. [2]
5. A country is envisaging to install coal (calorific value 20 MJ/kg, carbon fraction 0.55, ash content 35%) based additional thermal power generation capacity of 75000 MW with average annual coal utilization efficiency of 35%. Estimate the annual amount of carbon dioxide emissions likely to be released into the atmosphere for the additional power generation capacity based on coal if the new capacity installed is expected to operate with an average annual capacity utilization factor of 0.96. [2]
6. The following relationship is observed between the energy demand of a country and its GDP:
$$\log(\text{Energy Demand}) = 2.3 + 0.89 \log (\text{GDP})$$
The current energy consumption of the country is 1567 PJ. If the GDP of the country is expected to grow at a uniform annual rate of 6% for the next ten years, estimate the energy demand of the country during the tenth year from now. [2]
7. An energy planner suggested the following econometric model for energy demand (ED) of a country at time t:
$$\text{ED} (t) = a + (b) [\text{Energy Price} (t)] + (c) [\text{Income} (t)] - (d) [\text{Population of the Country} (t)] + (e) [\text{ED} (t-2)]$$
Point out apparent inconsistencies with the above model if a, b, c, d, and e all are positive coefficients. [3]