Energy Resources & Utilization

Session: 2k9 - 6th term   <u>Open Book Paper</u>   Max. Marks = 60

Note: _**Attach Excel Work Sheet with your answer book. Submit the Answer Book on-line by writing Paper-09-ME-ABC in subject of your e-mail. Use Winzip/Winrar to zip all your answers in one folder and name it as 09-ME-ABC. You have 72 hours to do this work. Try to solve with clarity and also be precise. Each Paper consists of 4 Questions and accommodates 24 students (06 groups). Try to solve the paper individually as copying is strictly forbidden and may liable to cancel the paper. You must follow the announced 'Layout' and 'rules' as information were provided in advance.**_

Question#01

ABC Company of power generation started production by newly built biomass plant of 20 MWe. The Company faces a cost of $C(q) = 1.5 q^2 + 15q$. The market price for each MWh sold of electricity is P = $90.

Which output level q* does the firm choose to maximize profit?

Derive the first and second order conditions.

What is the firm's marginal revenue?

What are the firm's marginal and average cost functions?

What is the producer's profit and his revenue?

Graphical representation:

1) Plot profit in one graph;

2) Plot marginal cost, price and average cost in 2nd graph;

3) Plot total cost and revenue in a third graph

Use Excel to plot the graph. Also attach the excel sheet containing the data and graph in your answer book.

Question#02

Demand is given by $q^D(p) = 1200 - p$.

The supply function is $q^S(p) = 300 + 2p$.

Determine the market equilibrium by using algebra.

What happens at the price of 5 €? What at the price of 10 €?

Plot the graphs and attach excel sheet in your answer work book.

Question#03

The following estimates for energy service of lighting show the country wide data. Try to develop your analysis based upon the 15% share increment of CFL. As we need to phase out Incandescent Bulb from our daily usage, so assume the loss in share of IB's is about 10% and the remaining of FTL. What would be difference in Electricity Usage between the Base-case scenario and 15% increment in CFL scenario? Also recommend the strategies of stock changeover of old lighting technology to new one. Develop your sensitivity analysis in Excel sheet and attach it with your answer book.

Write at least 300 words.

Lighting:					
No. of light points	17.4 Million approx.				
	Share (of no.)	**(Assumed) Watt Rating**	**Usage (hrs)**	**ELC usage (GWh)**	**Life (yrs)**
IB	0.36	70	2.9	3131.6	0.9
CFL	0.42	25	2.9	1304.8	9.4
FTL	0.22	40	3.3	1244.4	12.5
				5680.8	

Question#04

Plot the typical daily demand for electricity (kWh) in summer and winter season of your home and try to co-relate it with the following pie chart data. Attach the Excel sheet with your assumption and graphs.

The pie chart shows how electricity is used in an average Pakistani home. Summarize the information by selecting and reporting the main features and make comparisons where relevant.

You should write at least 250 words.

Energy Consumption Profile

Space heating 10%

Space cooling 31%

Lighting 23%

Refridgeration 10%

Misc. Electric 26%