



*Dr. Blosa Science*

Sponsored by  
**The Science Foundation College**  
**Uganda East Africa**  
Senior one to senior six  
**+256 778 633 682, 753 802709**  
**Based On, best for science**

[digitalteachers.co.ug](http://digitalteachers.co.ug)



*Nurture your dreams*

### UACE S101 General Paper section B: Logic Quiz 3

Study the information below carefully and then answer the questions which follow

The government of Uganda is deeply concerned about the country's energy need, in particular electric power. The country has one major source of electricity the hydro-generated power from Kiira and Nalubale stations on R. Nile.

The country's electricity needs for industrial and domestic consumption is 375 Megawatts with annual demand rise of 24.37%. Yet the total power generated from both Kiira and Nalubale stations is 254 Megawatts. This low power production is due to old power generation machinery and poor engineering planning in the power sector. Because of this, Load shedding (regulated power supply) is the order of the day across the country causing immeasurable social and economic inconvenience.

The government has mooted plans for private power developers to construct more stations on River Nile at Bujagali and Karuma falls. However, environmental concerns and financial hurdles by the World Bank and other Multi-lateral agencies have delayed these projects to take off.

Yet if Bujagali is constructed, 450 Megawatts would be generated and would take between 4-5 years to construct. On the other hand the Karuma dam project would generate 330 Megawatts and would take between 3-4 years to complete. The construction of these dams would kill off a thriving water-rafting sport which attracts thousands of foreign tourists each year fetching the country millions of dollars.

The government recently invited a Dubai based company Urvati to construct a thermal power plant to use diesel oil near Kampala. This plant will generate 50 Megawatts but use millions of litres of diesel each year. But even this project has drawn the attention of environmentalists citing pollution arising from the millions of litres of oil burnt.

At the start of this year, government liberalized the power sector by leasing the power distribution in the country to a South Africa Company called Umeme. Upon taking up the lease, the power tariffs were increased by 24%, which caused uproar from domestic and industrial users of electricity.

Uganda meanwhile has contractual obligation with Kenya government to supply 18 Magawatts to that country.

With its numerous rivers and in particular the mighty Nile, Uganda has the potential to be a net exporter of electricity to the neighboring countries like Rwanda, Kenya, Sudan and Tanzania.

### Questions

Using the information above.

- (a) Calculate
- The current electricity deficit of Uganda
  - The total electricity requirement of the country 8 years from now.
  - If the previous power tariff was 171 Ug. Shs per unit for domestic consumers, how much will a consumer who uses 312 units per month now pay over six months?
- (b) If and when Bujagali and Karuma dams are constructed, estimate the total minimum Megawatts of electricity that Uganda would be in position to export with the two power stations completed.
- (c) Why are environmentalists concerned over the construction of hydropower stations in Uganda.
- (d) What are alternative sources of power?

### Solutions

- (a) Calculate
- The current electricity deficit of Uganda  
Power deficit = power required – power generated  
 $= 375 - 254$   
 $= 121$  Megawatts
  - The total electricity requirement of the country 8 years from now.  
Annual rise in demand =  $(24.37 \times 375)/100 = 91.3875$  Megawatts  
Total demand rise in 8 years =  $91.3875 \times 8 = 731.1$  Megawatts  
Total electricity demand by the 8<sup>th</sup> year =  $375 + 731.1 = 1,106.1$  Megawatts.
  - If the previous power tariff was 171 Ug. Shs per unit for domestic consumers, how much will a consumer who uses 312 units per month now pay over six months?  
Rise in the cost per unit =  $(24 \times 171)/100 = 41.04$  (Shs.)  
New cost per unit =  $171 + 41.04 = 212.04$  (shs)  
Cost of 312 units =  $212.04 \times 312 = 66156.48/=$   
Cost of electricity in 6 months =  $66156.48 \times 6 = 396,938.88/=$   
Therefore the cost of electricity over six months is Shs. 396,938.88
- (b) If and when Bujagali and Karuma dams are constructed, estimate the total minimum Megawatts of electricity that Uganda would be in position to export with the two power stations completed.

Total power that would be generated

Karuma + Bujagali + Kiira + Nalubale =  $330 + 450 + 254 = 1,034$  Megawatts

$$\begin{aligned} \text{Power demanded in the fourth year at completion of the construction} &= 375 + (375 \times 24.37 \times 4)/100 \\ &= 740.55 \text{ Megawatts} \end{aligned}$$

$$\text{Excess power for export} = 1034 - 740.55 = 293.45 \text{ Megawatts}$$

Therefore, the total minimum Megawatts for export = 293.45 Megawatts

(c) Why are environmentalists concerned over the construction of hydropower stations in Uganda.

- Destroy rafting
- Pollute the environment
- Affect the beauty of places
- Reduction of water supply

(d) What are alternative sources of power to hydroelectricity?

- Solar power
- Wind mills
- Biofuel
- Use of fossils such as coal to generate energy
- Nuclear energy

Thank you

Dr. Bbosa Science