UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
(ONLINE)
SEMESTER II
SESSION 2020/2021

COURSE NAME	:	ENERGY ECONOMICS
COURSE CODE	:	MDL 10303
PROGRAMME	:	MDL
EXAMINATION DATE	:	JULY 2021
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **FIVE (5)** QUESTIONS **ONLY**.
		OPEN BOOK EXAMINATION.

THIS QUESTION PAPER CONSISTS OF **SEVEN (7)** PAGES

Q1 The supply of diesel to the consumers begins from the oil exploration and production works from the oil wells, followed by processing at the refinery before being transport to respective fuel stations. Given that the crude oil recovery rate from national oilfields is around 22% and the refinery operates at 92% efficiency level, which is capable to produce almost 25% diesel from every 1 barrel of crude oil that the refinery receives. Transportation of fuel from refinery to the user involves a 5.3% loss. A local trader wants to transport his vegetables stock, which involves driving for 58 km one-way. He uses a diesel-fuelled ISUZU ELF lorry that has fuel economy of 18.3 mpg (US). Using appropriate assumptions and referring to values presented in **Table Q1**:

(a) Analyse and characterise the related costs involved from the oil wells to the consumers.

(8 marks)

(b) Calculate how much crude oil is required to complete the trader's daily journey; and

(8 marks)

(c) Estimate the total costs needed by the trader to run the lorry to cover his daily journey.

(4 marks)

Q2 (a) Providing energy to the remote and rural communities has its unique challenges. Discuss the options that are available for generating energy and analyse the possible financial implications, for the following geographical locations:

(i) Tropical jungle with access to river upstream in Malaysia

(4 marks)

(ii) Hot and arid region in Middle East

(4 marks)

(iii) Mountainous region in China

(3 marks)

(b) **Figure Q2(b)** shows a typical schematic of a Hybrid Renewable Energy Systems (HRESs). Elaborate the advantages and the shortcomings of this system. Also evaluate the challenges in implementing this HRESs from economic and financial perspectives.

(10 marks)

Q3 **Table Q3** shows the population growth for Philippines from 2014 to 2019. **Figure Q3(a)** and **(b)** show the energy consumptions for the same duration.

Using that information:

(a) Determine the energy consumption per capita in 2025.
(b) Calculate the annual contribution of non-carbon-based fuels consumption to the total energy consumption; and
(c) Estimate the costs needed to increase solar energy-based consumption by 5% in 2025.

(20 marks)

Q4 (a) In economic terms, an externality is said to exist if any activity of an economic agent imposes positive or negative effects on the welfare of any other agent or groups of agents and when economic agents neither receive nor pay any compensation equal to the costs inflicted or the benefits conferred upon them. Evaluate the externalities for electricity and fuel production.

(5 marks)

(b) As externalities exist from the electricity and fuel production, therefore the cost of its correction requires government intervention either through taxation or through regulation. Propose the elements that you think can help the government to control the functioning of energy sectors.

(15 marks)

Q5 Company LUXEOIL, a small oil producer in a country has plan to trade their oil products internationally or regionally. Construct suitable supply demand diagrams for the following location of the company and provide explanation for each diagram.

(a) Company LUXEOIL is in a country with sufficient oil supply.
(b) Company LUXEOIL is in a country that resorts to importing to supplement the oil supply.
(c) Company LUXEOIL is in a net exporter country.
(d) Briefly estimate the opportunity costs of the situation in **Q5(a).**

(20 marks)

Q6 **Table Q6** shows one of example of the voltage level for TNB tariff classification. In 7 days a week, peak period is fixed from 0800 hours to 2200 hours and off-peak period starts from 2200 hours and ends at 0800 hours.

(a) Evaluate how the cost changes due to changes in peak and off-peak demand for this medium voltage peak/off-peak commercial tariff.

(b) Determine the issue that may be faced by the electricity provider when demand decreases.

(20 marks)

-END OF QUESTIONS-

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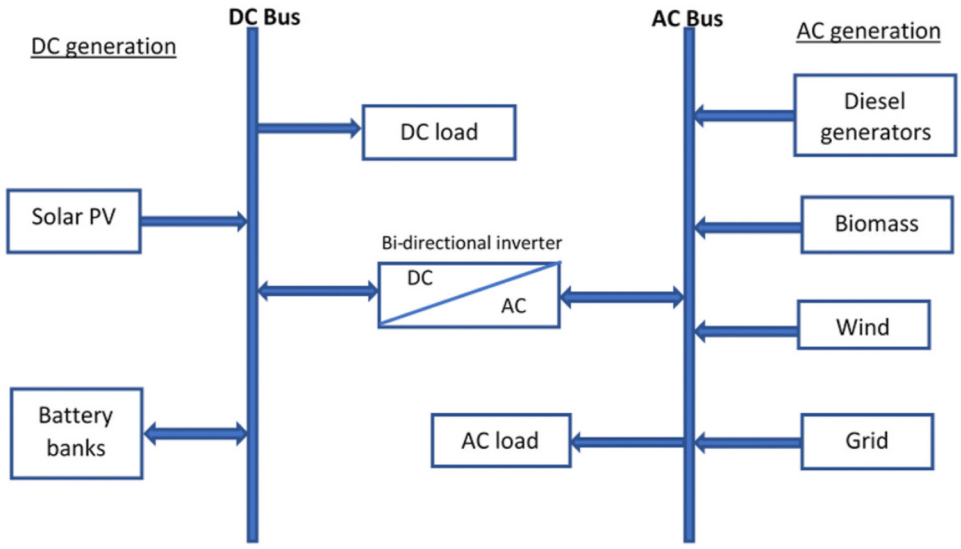
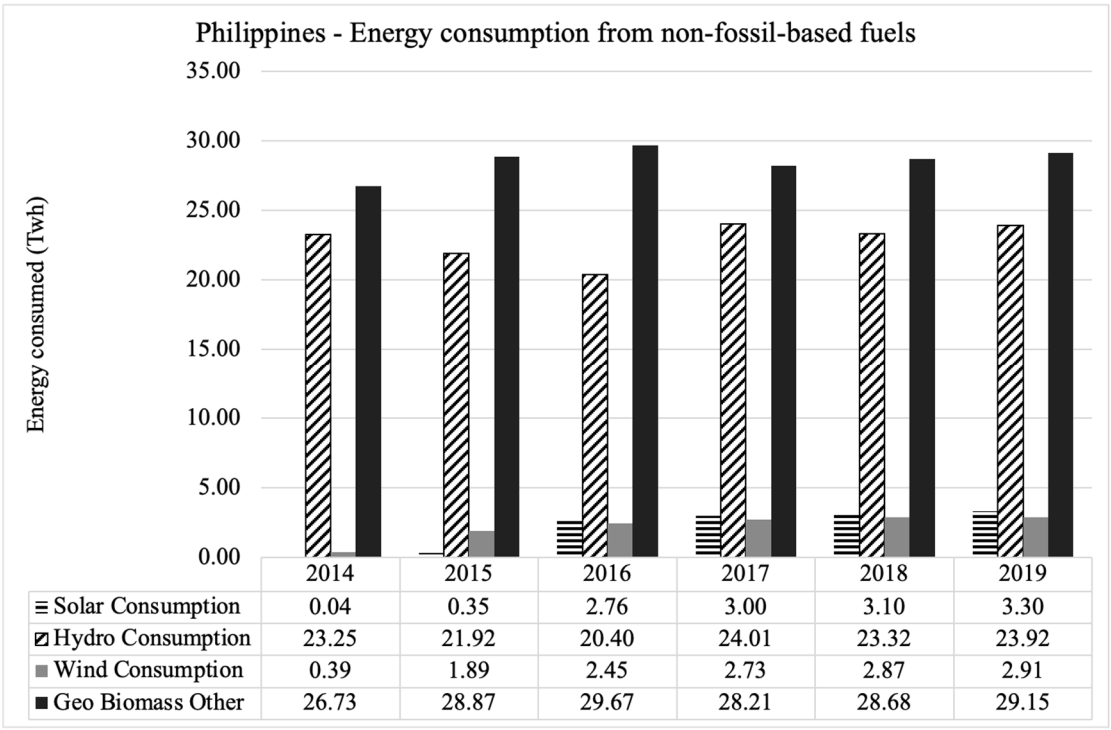


Figure Q2(b): Typical schematic of a hybrid renewable energy systems (HRESs)



	2014	2015	2016	2017	2018	2019
Solar Consumption	0.04	0.35	2.76	3.00	3.10	3.30
Hydro Consumption	23.25	21.92	20.40	24.01	23.32	23.92
Wind Consumption	0.39	1.89	2.45	2.73	2.87	2.91
Geo Biomass Other	26.73	28.87	29.67	28.21	28.68	29.15

Figure Q3(a): Energy consumption of Philippines from fossil-based fuel

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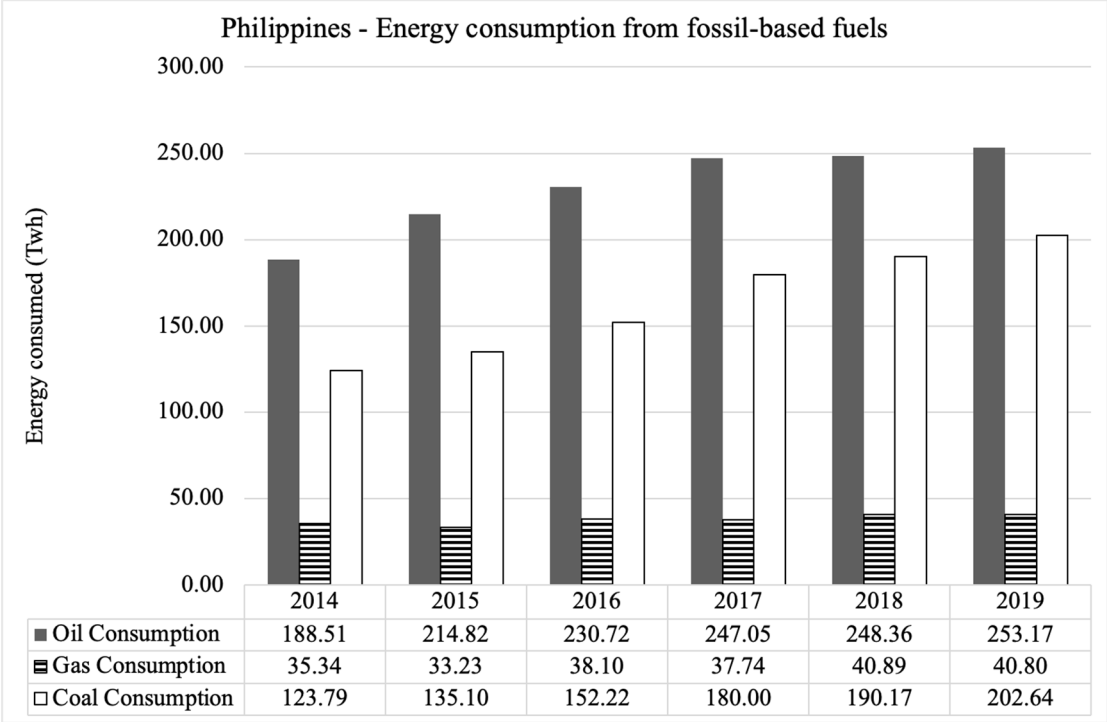

	2014	2015	2016	2017	2018	2019
Oil Consumption	188.51	214.82	230.72	247.05	248.36	253.17
Gas Consumption	35.34	33.23	38.10	37.74	40.89	40.80
Coal Consumption	123.79	135.10	152.22	180.00	190.17	202.64

Figure Q3(b): Energy consumption of Philippines from fossil-based fuel

Table Q1: Prices of crude oil, RON95 and diesel fuels (April 2021)

No.	Item	Price
1	Brent Crude Oil	USD66.57/barrel
2	Petrol RON95	RM2.05/litre
3	EURO 5 Diesel	RM2.15/litre

Table Q3: Philippines population (2014-2019)

Year	2014	2015	2016	2017	2018	2019
Population (millions)	100.513	102.113	103.663	105.173	106.651	108.116

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Table Q6: TNB Tariff Classification for medium voltage

Medium Voltage Peak/Off-Peak Commercial Tariff	**Unit**	**Rates**
For each kilowatt of maximum demand per month during the peak period	RM/kW	29.00
For all kWh during the peak period	sen/kWh	23.4
For all kWh during the off-peak period	sen/kWh	14.4
The minimum monthly charge is RM600.00		