UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2016/2017

COURSE NAME	:	POWER GENERATION, TRANSMISSION AND DISTRIBUTION SYSTEM
COURSE CODE	:	BEF 36003
PROGRAMME	:	BEV
EXAMINATION DATE	:	DECEMBER 2016 / JANUARY 2017
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

Q1 (a) Identify **four (4)** major parts of a modern complex interconnected power system.

(5 marks)

(b) (i) The combustion of coal to generate energy is an inherently dirty process. Point out **five (5)** types of the combustion product generated from a coal-fired power plant.

(5 marks)

(ii) Investigate the strategies that need to be implemented in order to control all the pollutants generated in a coal-fired power plant as listed in **Q1(b)(i).**

(10 marks)

Q2 (a) As a planning engineer, you have been assigned to design the transmission lines. Point out **six (6)** important technical aspects you need to consider in designing efficient transmission lines.

(6 marks)

(b) The towers of height 30m and 70m respectively support a transmission line conductor at water crossing. Bases of the towers can be considered to be at water level. The horizontal distance between the towers is 400 m and weight of conductor is 1.5kg/m. If the tension in the conductor is 1500 kg,

(i) Determine the minimum clearance of the conductor and water.

(10 marks)

(i) Calculate the clearance mid-way between the supports.

(4 marks)

Q3 (a) (i) List down **four (4)** parameters of electrical characteristic for a transmission line.

(4 marks)

(ii) Skin effect is caused by magnetic flux set up due to alternating current inside the conductor. Explain the skin effect and discuss this phenomenon in d.c system.

(4 marks)

(b) A three-phase, 50 Hz, 132 kV overhead line has conductors placed as shown in **Figure Q3(b)**.Conductor diameter is 3cm and the line length is 120km. Assumed the line is completely transposed and neglecting the effect of ground.

(i) Determine the capacitance of the transmission line per phase.

(8 marks)

(ii) Determine the reactive power from charging the capacitance.

(4 marks)

Q4 (a) Compare the short and medium transmission lines interms of the range of length and the nominal π model.

(6 marks)

(b) A 220 kV, 200 MVA and 50 Hz, three-phase transmission line is 150km long completely transposed transmission line has the following positive-sequence impedance and admittance:

$r = 0.11\ \Omega/km$
$x = 0.90\ \Omega/km$
$y = 5.0 \times 10^{-6}\ S/km$

The voltage at the receiving end of the transmission line is 200kV, determine:

(i) The values of series impedance and shunt admittance of the transmission line.

(1 mark)

(ii) The value of sending end voltage if the line supplying rated voltage and rated apparent power at 0.85 PF lagging

(8 marks)

(iii) The value of voltage regulation of the transmission line.

(1 mark)

(iv) The efficiency of the transmission line when it is supplying rated apparent power at 0.85 PF lagging.

(4 marks)

Q5 (a) Briefly explain **two (2)** effects of low power factor in power supply system.

(4 marks)

(b) A single phase motor connected to 400 V, 50 Hz supply takes 35.8 amperes at a power factor of 0.75 lagging.

(i) Sketch the circuit and phasor diagrams with appropriate labels when the capacitance is connected in parallel with the motor in order to increase the power factor.

(2 marks)

(ii) Propose the capacitance required to raise the power factor to 0.95 lagging.

(5 marks)

(c) A 2km long single phase distributor supplies a load of 120A at 0.8 p.f. lagging at its far end and a load of 80A at 0.9 p.f. lagging at its mid-point. Both power factor are referred to the voltage at the far end. The resistance and reactance per km are 0.05Ω and 0.1Ω respectively. If the voltage at the far end is maintain at 230V, by sketching the single line diagram for the distributor AB with C as the mid-point, analyze:

i) Voltage at the sending end.

(8 marks)

ii) Phase angle between voltage at the two ends.

(1 mark)

- END OF QUESTIONS -

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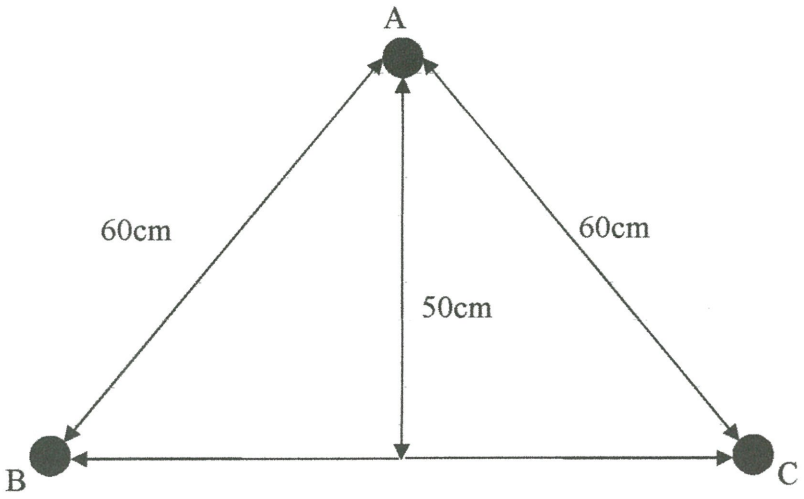

Figure Q3(b)