**SOUTH EASTERN KENYA UNIVERSITY**

**UNIVERSITY EXAMINATIONS 2016/2017**

**FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF**

**SCIENCE (ELECTRONICS)**

**ELC 321: COMMUNICATION ELECTRONICS 1**

**6TH DECEMBER, 2016**

**TIME:8.00-10.00 A.M**

**INSTRUCTIONS:**

1. Attempt question **ONE** and any other **TWO** questions

2. Question one carries **30 marks** while the rest carry **20 marks each**

**QUESTION ONE (30 MARKS)**

(a) (i) What is a transmission line?

(2Marks)

(b) (ii) In radio communication, during transmission three main intermediate phenomenon

are involved. Name them

(c) (i) Name the distributed parameters associated with a transmission line.

(4Marks)

(4Marks)

(d) (ii) Using (b) (i) approximate an equivalent circuit of a transmission line. (3Marks)

(c) (i) What is an antenna?

(ii) Distinguish between Field strength pattern and power pattern as applied

to antennas

(d) Calculate the efficiency of a ground aerial operating at 500Kc/s and

having a total resistance of 12 ohms with effective height of 30meters.

What is the directivity?

(e) Briefly explain the following terms as applied to antennas

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(2Marks)

(4Marks)

(4Marks)

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(i)

(ii)

(iii)

Driven elements,

Parastic elements

Yagi antenna.

(2Marks)

(2Marks)

(3Marks)

**QUESTION TWO (20 MARKS)**

(a) Broadly classify transmission lines.

(4Marks)

(b) Derive expression for the conductance of two parallel round conductors. (8Marks)

(c) A cable pair is loaded with 6mH coils at intervals of 0.9 Km for the operation at

frequencies upto 16 Kc/s. At this frequency the primary constants of the cable are:

R = 77𝛺, L = 1.0 mH, C = 0.065 𝜇𝐹 and G = 50𝜇𝑚ℎ𝑜 allper loop Km and the effective

resistance of each loading coil is 4.5 𝛺. Estimate the attenuation per Km of the load

cable.

(8Marks)

**QUESTION THREE (20 MARKS)**

(a) Show that the electric field strength due to a short grounded transmitting antenna is given

by 𝑑𝐸 =

meaning.

60 𝜋𝐼0𝑑𝑙 𝑠𝑖𝑛𝜃

𝜆𝑟

𝑟

𝑐

(15Marks)

(b) An antenna has a radiation resistance of 72 𝛺 and a loss resistance of 10 𝛺 and a power

gain of 15. What is the directivity?

(5Marks)

**QUESTION FOUR (20 MARKS)**

For a transmission line, derive the expressions for the propagation constant (𝛼) and the

phase constant (𝛽) for the following conditions

(a) Low distortions

(b) Low loss.

(10Marks)

(10Marks)

**QUESTION FIVE (20 MARKS)**

(a) Sketch the pattern of a broad side array of four in phase isotropic point sources of equal

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× cos 𝜔(𝑡 − ) 𝑣𝑜𝑙𝑡 /𝑚𝑒𝑡𝑒𝑟, where symbols have their usual

amplitude. The spacing between source is taken to be half-wavelength.

(8Marks)

(b) A transmitter is fed with 100 W of power and produces the field strength at a given point

𝜆

as 2 dipole fed with 200 Kw of power. Calculate the gain of the aerial

(i)

(ii)

𝜆

Relative to 2 dipole

Relative to an isotropic radiator.

(7Marks)

(5Marks)

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