NNAMDI AZIKIWE UNIVERSITY, AWKA
FACULTY OF ENGINEERING

DEPARTMENT OF ELECTRONIC & COMPUTER ENGINEERING

Course title: Principles of Telecommunication I

Course code: ECE 321. Session: 2020/2021

Semester: 1st Semester. Date: Wednesday, 14th Dec, 2022. Time allowed: 1.30mins (4.00pm – 6.00pm)

Instruction: Answer five questions only . Answer all Questions from SECTION A, Any two (2) Questions From SECTION B

Cell phones are prohibited in the Examination Hall.

SECTION A

Q1 Design a log periodic antenna for the FM broadcast band (88 – 108MHz), using a rating factor of 0.92 and d_1 equal to 0. 08λ.What is the length of antenna support boom?

Q2.
(a) Mention three fundamental limitations in electrical communication.
(b) What is modulation?
(c) A 500W carrier is simultaneously modulated by two audio signals with modulation percentage of 60 and 80 respectively. What is the total sideband power radiated?

Q3 a. Explain in details "Signal-to- Noise Ratio (SNR).

b. What is Noise Control, giving examples? How can modern active noise be controlled?

SECTION B

Q4.) Explain the functions of the following in a communication system model. (I) Input transducer (Ii) Transmitter (iii) Receiver

(b) Various modulating techniques may be grouped into two basic types according to their kind of carrier wave, what are they?

(c)An AM transmitter radiates 60KW of carrier power. What would be the radiated power at 60% modulation.

Q5.(a) . With the aid of modulated signal waveform, discuss Frequency Modulation and Phase Modulation.

b. What are distinguish features of Narrowband FM and Wideband FM signals?

c. How are Frequency Modulation and Phase Modulation related.

Q6. . Name Four sources of power loss in antenna

b. An antenna must be fed with 10kW of power to produce the same field at a given point as a $\lambda/2$ dipole fed with 20kW of power. Calculate the gain of the antenna

i. Relative to a $\lambda/2$ dipole
ii. Relative to an isotropic radiator
iii. If a modification to the antenna results in 10kW input power doubles the field strength at same point. Calculate the new antenna gain relative to the $\lambda/2$ dipole.

Good Luck !!

NNAMDI AZIKIWE UNIVERSITY, AWKA
FACULTY OF ENGINEERING
DEPARTMENT OF ELECTRICAL ENGINEERING
2021/2022 FIRST SEMESTER EXAMINATION

Systems

Two (2) questions from each section. Attempt Four (4) questions in all.

ent of a transformer is 5A at 0.25 p.f when supplied at 235V, 50Hz. The number
y winding is 2kΩ. Calculate (i) the maximum value of flux in the core (ii) the
gnetizing component

diagrams for a transformer on (i) non-inductive load (ii) inductive load (iii)

nsformer not operated on a dc supply?

a well labelled diagram show the Steam Power Plant

ansformer takes 0.5A at a p.f of 0.3 on open circuit. Find the magnetising and
no-load primary current.

e on seven (7) different sources of electricity generation.

ferent types of Transformer losses.

50Hz single phase transformer is built on a core having an effective cross-sectional
and has 80 turns in low voltage winding. Calculate (a) the value of maximum flux
(b) number of turns in high voltage winding.

ical transformer.

of diagram show the open cycle gas turbine.

n between a Substation and a bus bar.

e following types of tariff and give their advantages and disadvantages.

factors considered in the selection and location of site for a substation.

service rendered classification of a substation.

n detail three types of bus bar systems.

forms the choice of each type to be installed in a substation.

the power factor tariff.

classification of a substation on the basis of design.

gle phase overhead transmission line delivers 1100kW at 22kV at 0.8 p.f lagging. The total
e is 5Ω and the inductance of 3.182mH is obtained in the line. Determine the (i)sending end
(ii) the sending end power factor (iii) the transmission efficiency and (iv) percentage voltage

on.

on in details the equal and unequal arrangement of conductors in a 3-phase transmission.

endant challenges and how to mitigate it.

NNAMDI AZIKWE UNIVERSITY, AWKA
FACULTY OF ENGINEERING
DEPARTMENT OF ELECTRICAL ENGINEERING
2021/2022 FIRST SEMESTER EXAMINATION

Course Title: Power Systems
Course Code: ELE 353
Time Allowed: 2Hours
Instruction: Attempt Two (2) questions from each section. Attempt Four (4) questions in all.

SECTION A

1(a) The no-load current of a transformer is 5A at 0.25 p.f when supplied at 235V, 50Hz. The number of turns on the primary winding is 200. Calculate (i) the maximum value of flux in the core (ii) the core loss (iii) the magnetizing component.
(b) Draw the phasor diagrams for a transformer on (i) non-inductive load (ii) inductive load (iii) capacitive loads.
(c) Why should a transformer not operated on a dc supply?

2(a) With the aid of a well labelled diagram show the Steam Power Plant.
(b) A 2200/250V transformer takes 0.5A at a p.f of 0.3 on open circuit. Find the magnetising and active component of no-load primary current.
(c) Write short note on seven (7) different sources of electricity generation.

3(a) Explain the different types of Transformer losses.
(b) A 3000/200V, 50Hz single phase transformer is built on a core having an effective cross-sectional area of 150cm2 and has 80 turns in low voltage winding, Calculate (a) the value of maximum flux density in the core (b) number of turns in high voltage winding.
(c) Explain the ideal transformer.
(d) With the aid of diagram show the open cycle gas turbine.

SECTION B

4(ai) Distinguish between a Substation and a bus-bar.
(aii) Discuss the following types of tariff and give their advantages and disadvantages.
(b) Explain the factors considered in the selection and location of site for a substation.
(c) Explain the service rendered classification of a substation.

5(a) Explain in detail three types of bus-bar systems.
(bi) What informs the choice of each type to be installed in a substation.
(bii) Explain the power factor tariff.
(c) Give the classification of a substation on the basis of design.

6(a) A single phase overhead transmission line delivers 1100kW at 22kV at 0.8 p.f lagging. The total resistance is 5Ω and the inductance of 3.182mH is obtained in the line. Determine the (i)sending end voltage (ii) the sending end power factor (iii) the transmission efficiency and (iv) percentage voltage regulation.
(b) Explain in details the equal and unequal arrangement of conductors in a 3-phase transmission line, attendant challenges and how to mitigate it.

NNAMDI AZIKIWE UNIVERSITY AWKA,
ELECTRICAL ENGINEERING DEPARTMENT
First Semester Examination 2021/2022

Course: Circuit Theory II, **Course Code:** ELE 311, **Time allowed:** 2 hrs. **Date:** 14/12/2022
Instruction: Attempt 4 Questions in all.

Question 1:

(a) State the following
- (i) Thevenin's theorem
- (ii) Maximum Power Transfer theorem

(b) Find the Thevenin's equivalent circuit of the circuit in fig 1, given that E1 =10V, E2 =10V, R1 =1k, R2 =4k, R3 =6k, and R4 =1k. Find also the load current.

Question 2:

(a) (i) What is Mutual Inductance? State two conditions for magnetic coupling to take place between two coils.

(ii) State Superposition theorem.

(b) In the circuit of fig.2 shown below, use superposition theorem to determine the current flowing in the 10 kilo ohm resistor, given that R1 =15k, R2 =10k, R3=12k, E1 =10V, and E2 =15V.

Question 3:

(a) (i) State three conditions that generate transient disturbances in electric circuits.

(ii) Define the term **'Time Constant'** of a circuit.

(b) A resistance of 10 ohms is connected in series with an inductance of 0.2 H, and 150V is suddenly applied across the series connection. Find the voltage drop across the inductor (i) at the instant of switching on (ii) at 0.01 second. Find also the flux linkages at these instants.

Question 4:

(a) (i) What do you understand by Duality in electric circuits? Name any three dual pairs you know.

(ii) State Norton's theorem.

(b) Looking at fig. 4, find the Norton's equivalent circuit and determine the load current IL.

Question 5:

(a) Define the following

(i) Complex Transient. (ii) Ideal transformer. (iii) Isolation transformer

(b) Calculate the phasor currents I1 and I2 in the circuit of fig.5.

Fig. 1

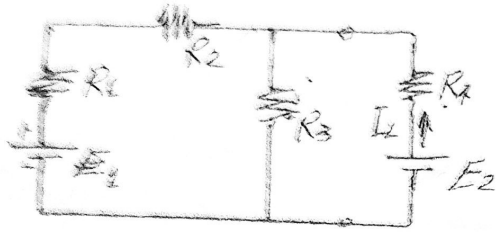


Fig. 2

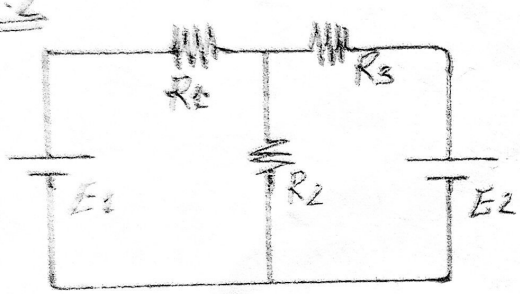


Fig. 4

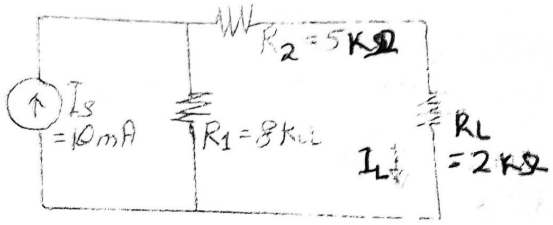
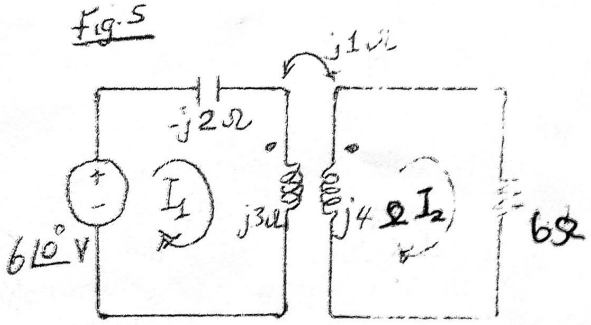


Fig. 5



NNAMDI AZIKIWE UNIVERSITY, AWKA

FACULTY OF ENGINEERING

1st SEMESTER EXAMINATION, 2020/2021 ACADEMIC SESSION, DATE: 15th Dec, 2022.

FEG 303 – ENGINEERING MATHEMATICS III; Instruction: Answer all questions; TYPE B

1) Solve the following set of linear equations using the matrix method $x_1 + 2x_2 + x_3 = 4$; $3x_1 - 4x_2 - 2x_3 = 2$; $5x_1 + 3x_2 + 5x_3 = -1$ (a) (2,-4,2) (b) (3,2,5) (c) (2,3,4) (d) (2,3,-4) E (2,3,-5)

2) Solve the following set of linear equations using the matrix method $3x + 2y + 4z = 3$; $x + y + z = 2$; $2x - y + 3z = -3$ (a) (1, 2,-1) (b) (-1,-2,1) (c) (1,3,2) (d) (2,-3,1) E (2,3,-5)

3) Determine the eigenvalues for the equation $Ax=\lambda x$; Where $A = \begin{pmatrix} 2 & 1 & 1 \\ 1 & 3 & 2 \\ -1 & 1 & 2 \end{pmatrix}$ (a) (1,-2,4)

(b) (-1,2,4) (c) (1,2,4) (d) (1,-2,3) (e) (1,2,-4)

4) Determine the corresponding vectors to each eigenvalue (in question 3) (a) $\begin{bmatrix} 1 & 1 & 4 \\ 0 & 1 & 3 \\ 1 & -1 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 0 & 1 & 3 \\ 1 & 1 & 5 \\ -1 & -1 & 1 \end{bmatrix}$ (c) $\begin{bmatrix} 0 & 1 & 5 \\ -1 & 2 & 3 \\ 1 & 1 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 0 & 1 & 3 \\ 1 & -1 & 1 \\ -1 & 1 & 5 \end{bmatrix}$ (e) $\begin{bmatrix} 0 & 1 & 3 \\ 1 & -1 & 5 \\ -1 & -1 & 1 \end{bmatrix}$

(5) The beta function is defined mathematically as $\beta(l,m) =$ (a) $\int_0^1 x^{1-l}(1-x)^{1-m}dx$ (b) $\int_0^\infty x^{l-1}(1-x)^{m-1}dx$ (c) $\int_0^\infty e^{-x}x^{n-1}dx$ (d) $\int_0^1 x^{l-1}(1-x)^{m-1}dx$

(6) Evaluate $\int_0^\infty \sqrt{x}\ e^{-x}\,dx$ A)

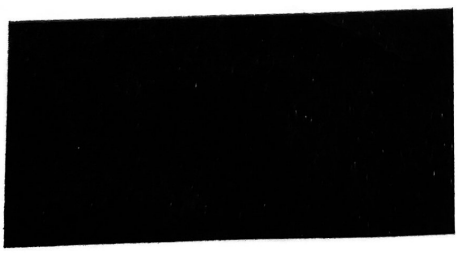
A) $\Gamma(7/2)$ E $\Gamma(3/2)$ C) $\Gamma(2/3)$ D) $\sqrt{\pi}$

(7) Determin Laplace transform of $e^{3t}\cos 4t$ (a) $\frac{s-3}{s^2-3s+24}$ (b) $\frac{s-3}{s^2+6s+16}$ (c) $\frac{s+3}{s-8s+9}$ (d) $\frac{s-3}{s^2-6s+24}$

(8) Find the inverse transform of $\frac{5}{(s-4)^3}$ (a) $5t^3e^{4t}$ (b) $5t^2e^{4t}$ (c) $10te^{4t}$ (d) $5t^5e^{2t}$

(9) Determine $L\{e^{-2t}\}$ (a) $\frac{1}{s+2}$ (b) $\frac{1}{s-2}$ (c) $\frac{2}{s+1}$ (d) $\frac{1}{s+4}$

(10) Evaluate the $l^{-1}\ \frac{12}{s^2-9}$ A. sinh3t B. cosh3t C.4sinh 3t D. 4Cosh 3t



Use the figure below to answer question 11 and 12

11) find f(x) A. fx=(x+5) B. fx=(x-1) C. fx=(x+2) D. fx=(-x-5) E. fx= fx=(x+7)

12) Find the period and amplitude A.(-1, 2) B. (7,2) C. (2,2) D. (-5,2) E. (-1,1)

Theory

1. Solve; $A=\begin{bmatrix} 2 & 0 & 1 \\ -1 & 4 & -1 \\ -1 & 2 & 0 \end{bmatrix}$ Solve for Eigen Values & Vectors.

2. Evaluate the following;

(i) $\int_0^{\infty} \sqrt{x}\, e^{-3\sqrt[3]{x}} dx$

(ii) $\int_0^1 x^4(1-x^3)^{-1/2} dx$

3. Solve the equation $\frac{d^2x}{dt^2} - 3\frac{dx}{dt} + 2x = 2e^{3t}$ insert the initial conditions $x_0 = 5, x_1 = 7$

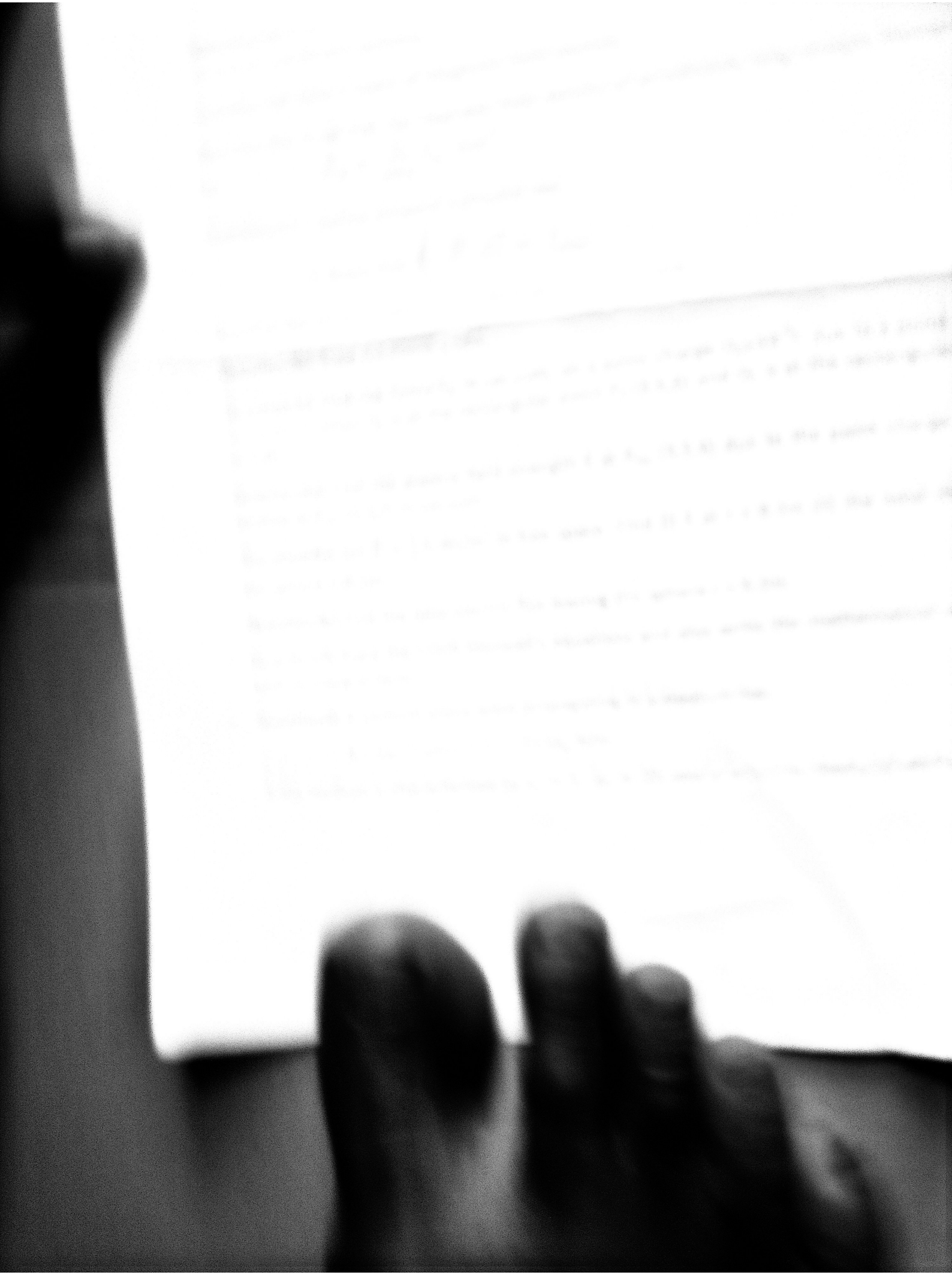
4. [redacted]

A. In each of the following state the (a) amplitude and (b) period

I. Y=6sin 2x/3

II. 3 cos 6x

B. Define analytically the periodic function above [redacted]



ELECTRICAL ENGINEERING DEPARTMENT
NNAMDI AZIKIWE UNIVERSITY AWKA
2021/2022 FIRST SEMESTER EXAMINATION
ELE341: ELECTROMAGNETIC FIELDS AND WAVES

INSTRUCTION: Answer ONLY four questions — Time: 2HRS

Question1a) Vectors A= $5a_x + 4a_y + 3a_z$, B= $2a_x + 3a_y + 4a_z$ are situated at point (x,y,z). Find (i)A+B (ii) A · B (iii) A x B

Question1b) Point P(2, 5,6) is in cartesian coordinate system. Express point P in Cylindrical and Spherical coordinate systems.

Question2a) State 3 types of Magnetic field sources

Question2b) Show that the magnetic field density of an infinitely long straight filament is given by: $\bar{H}_2 = \frac{I_1}{2\pi\rho}\hat{a}_\emptyset$ Am^{-1}

Question2c) i. Define Ampere's circuital law

ii. Show that $\oint_L \bar{H}.d\bar{l} = I_{enc}$

Question3a) What is Electric Field Strength? State its unit.

Question3b) State Coulomb's Law.

Question3c) Find the Force F_2, in vacuum, on a point charge Q_2=10^{-5}C due to a point charge Q_1=4×10^{-4} C when Q_2 is at the rectangular point P_2 (3,5,6) and Q_1 is at the rectangular point P_1 (0,2,3).

Question4a) Find the electric field strength E at P_{rec} (3,5,6) due to the point charge Q= 6×10^{-4}C located at P_{rec} (1,2,3) in vacuum.

Question4b) Let $\bar{D} = \frac{r}{3}\hat{a}_r$Nc/m^2 in free space. Find (i) E at r = 0.2m (ii) the total charge within the sphere r=0.2m

Question4c) Find the total electric flux leaving the sphere r = 0.2m.

Question5) State the FOUR Maxwell's equations and also write the mathematical expression of each in integral form.

Question6) A uniform plane wave propagating in a medium has

$$E = 2e^{-\alpha z}sin(10^8t - \beta z)a_y \text{ V/m.}$$

If the medium is characterized by $\varepsilon_r = 1$, $\mu_r = 20$, and $\sigma = 3$ S/m, find α, β, and H.

NNAMDI AZIKIWE UNIVERSITY AWKA
FACULTY OF ENGINEERING
DEPARTMENT OF ELECTRICAL ENGINEERING
FIRST SEMESTER EXAMINATION
COURSE TITLE: ELECTROMECHANICAL DEVICES/MACHINES
COURSE CODE: ELE 343 TIME: 1 ½ HRS
INSTRUCTION: ATTEMPT 4 QUESTIONS ONLY. ATTEMPT A MINIMUM OF 1 QUESTION FROM EACH SECTION

SECTION A:

No.1

a. "Electromechanical energy conversion takes place via the medium of a magnetic or electric field, the magnetic field being most suited" – Justify your stand!
b. What are the essential parts of an electromechanical conversion systems?
c. Using a well labelled diagram, describe the electric door bell as an electromechanical device.

No. 2

a. Explain briefly the features of Electromechanical energy conversion.
b. "In the sake of electromechanical energy conversion, various losses occur in the system"
   i. List and explain these losses.
   ii. Suggest ways of minimizing them.

SECTION B:

No. 3

a. state the various types of transformers
b. a 100kVA, 4000v/200v, 50Hz single -phase transformer has 100 secondary turns. Determine

i. the primary and secondary current
ii. the number of primary turns
iii. the maximum value of flux

No. 4

a. What are the two major sources of losses in transformers on load?
b. A transformer has 600 primary turns and 150 secondary turns. The primary and secondary resistances are 0.25Ω and 0.01Ω respectively and the corresponding leakage reactances are 1.0Ω and 0.04Ω respectively. Determine;

i. the equivalent resistance referred to the primary winding

ii. the equivalent reactance referred to the primary winding
iii. the equivalent impedance referred to the primary winding
iv. the phase angle of the impedance

No.5.

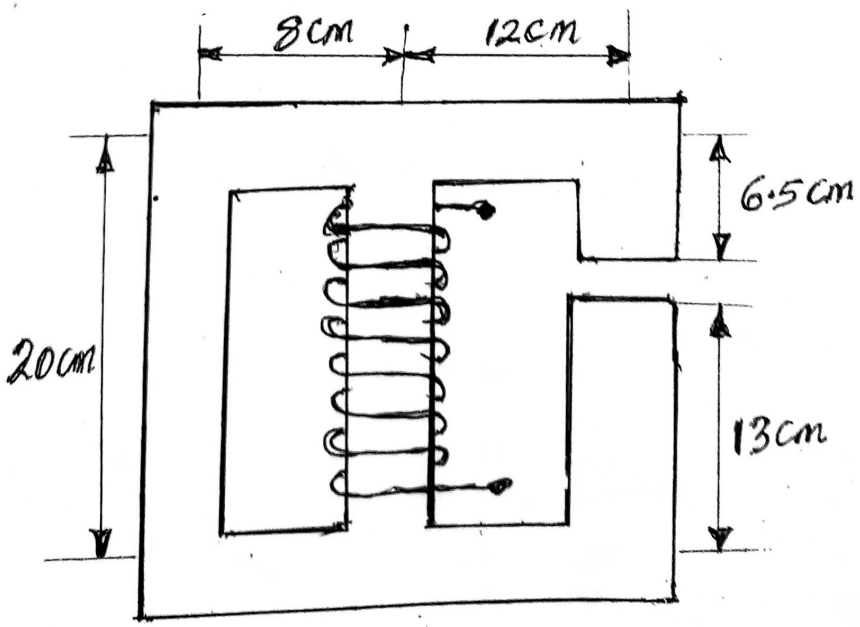
a. Write short notes on any four (4) of the following magnetic circuit terminologies
   i. Permeability (ii) hysteresis (iii) magnetomotive force (iv) magnetic field intensity (v) magnetic fringing
b. A cast iron ring of diameter 15cm has a coil of 120 turns wound uniformly around its circumference. If the relative permeability of the material is 240, calculate;

i. The reluctance of the ring (ii) the current required to produce a flux of 700μwb in the ring

No. 6

a. With the use of appropriate diagram, describe the process of magnetic shielding.
b. The figure below shows a magnetic circuit having an air gap with dimensions given. The centre limb has an area of $8cm^2$, while the area of the remaining parts of the circuit is $4cm^2$

i. Calculate the total reluctance of the circuit (ii) if an mmf of 300A is applied on the centre limb, estimate the flux destiny in each part of the circuit. (Assume relative permeability of 2000 for the magnetic material).



Nnamdi Azikiwe University Awka

Faculty of Engineering

Electronic and Computer Engineering Department

First Semester Examination 2021/2022 Session

Electronic Devices and Circuits ECE 323

Answer four Questions Time: 1 hour, 30 minutes

1. (a) Represent diagrammatically the Hybrid π model for a BJT Common Emitter amplifier circuit. The circuit analysis should give satisfactory result at both low and high frequencies.

(b) List five notations or parameters including the transconductance (g_m) of the illustrated circuit diagram in (1a).

(c) Given the following h-parameters values of the amplifier, h_{ie} = 4kΩ, h_{re} = 0.2 x 10,$^{-3}$ h_{fe} = 100, h_{oe} = 12μmhos, Load resistance (R_L) = 2 kΩ. Compute:

(i) the current gain (A_i) of the amplifier (ii) The voltage gain (A_V) of the amplifier

2. (a) (i) What is power amplifier?

(ii) Describe briefly Class A, Class B, and Class C amplifier.

(b) Briefly illustrate with the aid of a diagram how to improve the full power efficiency of the Class A amplifier using a Transformer Coupled Amplifier circuit.

(c) (i) Why is Class C power amplifier not suitable for audio application?

(ii) Give the advantages and disadvantages of Class C power amplifier

(iii) Give four applications of Class C power amplifier.

3. (a) Determine the voltage gain, input and output impedance with feedback for voltage-series feedback having A = -100, Ri = 10 k and Ro = 20 k for feedback of (a) β = -0.1 , (b) β = -0.5

(b)(i) What is a feedback amplifier?

(ii) Mention types of feedbacks

(iii) List 2 advantages each for the types of feedbacks mentioned in (b) above.

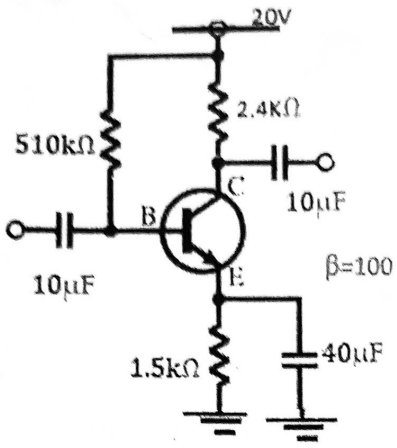
4a. Derive from first principle, the base current and other parameters for an emitter-stabilized bias circuit and use the derived equation to solve for the following in the figure below.

(i) I_B

(ii) I_C

(iii) V_{CE}

(iv) V_C
(v) V_B
(vi) V_E



b. (b). How do you test a transistor to know if it is NPN or PNP? Also state how you can identify the Collector, Base and Emitter of a BJT transistor.

(c). How do you know if a transistor is bad using a multimeter?.

5. In order to power your amplifier circuit, you are required to design a DC power supply system.

(a). Draw the block diagram of a simple power supply circuit

(b). Draw the circuit diagram of a 12V DC power supply system and explain the function of each component used.

(a). Show how you test for the output of the power supply circuit using a multimeter.

6. (a) What is a single stage transistor amplifier?

(a). Draw and label properly a basic single stage transistor amplifier

(b) Explain the functions of following parts of a single stage transistor amplifier.

(i) Biasing circuit

(ii) Input capacitor

(iii) Emitter bypass capacitor

(iv) Coupling capacitor

(d) Mention three basic applications/uses of transistors

Nnamdi Azikiwe University Awka
Department Of Electronic And Computer Engineering
First semester examinations 2021/2022
ECE 333: Digital System Design 1: Time 1.5 hrs.
Instructions: Attempt 3 Questions In All,
(Question 2 is Compulsory)

SECTION A:

a. Outline 5 basic laws/theorems of Boolean Algebra as applied in Digital Electronics. **5 marks**

b. Simplify the following functions using Boolean Algebra:
i. $Z = [(A + B\,C) . (D + E\,F)]'$. **2 marks**
ii. $Z = [A + B' . C]'$ **2marks**

c. Given the function, $F(A, B, C, D) = \sum m(1, 3, 5, 7, 8, 9, 11, 12, 13, 14, 15)$
i. Write out the minterm and maxterm expressions of the logic function. **4 marks**
ii. Simplify the minterm expression using kanaugh map. **5 marks**
iii. Draw the symbolic diagram of the simplified function. **2 marks**

2a. Outline the basic steps involved in designing combinational logic circuits **5 marks**

b.. A car ignition system is designed such that an alarm goes ON whenever the following conditions occur:
i. The engine is running and the door is open.
ii. The engine is OFF while the door is open and the key is in the ignition.
iii. The engine is running, the door is closed and occupied sit belt is not locked.
Design a combinational logic circuit that would produce a HIGH signal at the output to trigger the alarm system whenever the stated conditions occur.
Note: state all assumptions made. **25 marks**

3.. To avoid controversies that trails VAR goal line decisions in football matches you are tasked by FIFA to equip each of their balls with motion tracking ability using a 500Hz Inertial Measurement Unit (IMU) sensor to help improve the existing goal line technology. For your idea pitch, answer the following hypothetical questions.

i. Indicate the complications that would arise from negative instances of your sensor reading, and how would it be handled. 10 marks

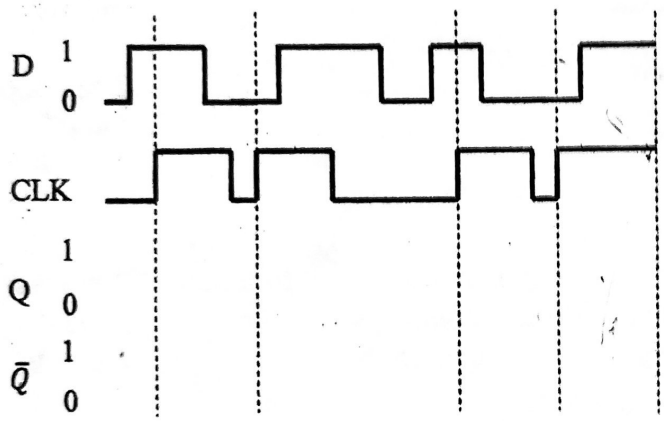
ii. If during implementation, a serial transmission of 5B0A.2E4 and 1467_8 was obtained from the sensor, calculate the 2's complement of the received signal transmission. 10 marks

4.(i)With the aid of truth tables only differentiate between a J-K flip-flop and S-R flip-flop.

8 Marks

(ii) Why would you choose J-K flip-flop over S-R flip-flop as a logic designer.**2 Marks**

b. Determine the output of timing diagram for Q and $\bar{Q}$ for the D-type flip-flop.



10 Marks

5. Convert the following decimal numbers to binary using the sum of weights method

i. 25 ii. 58

iii. Convert 10000110$_2$ to BCD iv. Convert $F80B_{16}$ to binary **10 Marks**

B. attach odd parity bit to the following numbers

i. 1010 ii. 111000 iii. 101101

iv. what is the disadvantage of using parity bit in error detection. **10 Marks**

NNAMDI AZIKIWE UNIVERSITY, AWKA
DEPARTMENT OF ELECTRONIC AND COMPUTER ENGINEERING
ECE 331 – SIGNALS AND SYSTEMS FIRST SEMESTER EXAMINATION
2021/2022

Answer Three (3) Questions only including Q1. Show all your work on the Exam Answer scripts and make sure you justify all your answers (results that are not explained or justified may count less, even if they are correct). Duration: 1Hr 30minutes. **God bless!**

1. a) As a 300-level student, describe in clear terms the importance of the course signals and system and explain the key terms – Signals and Systems. *(10 Marks)*

   b) Determine whether the following signals are periodic or not: *(10 Marks)*

   i. $x(t) = Sin5\pi t$
   ii. $x(t) = Sin\pi t$

   c) Sketch the continuous-time signal given by *(5 Marks)*

$$x(t) = \begin{cases} 0.5^t, & t \geq 0 \\ 0, & otherwise \end{cases}$$

2. In 2018, a realistic-looking video that seemed to show former President Barack Obama cussing and calling President Donald Trump a "total and complete deeps--t," went viral, bringing attention to the dangers of a controversial video-editing technology that many have called "the future of fake news."To achieve this Artificial Intelligence based technology called Audio Deep fake, several processes were employed, one of which involved audio pre-processing. Explain in detail like you were taught in this course the key processes involved in executing this process. *(25 marks)*

3. a) Mathematically describe the Z-transform of a discrete sequence $x(n)$; using label diagram explain the region of convergence (ROC) *(15 marks)*
   b) Determine the Z-transform of the discrete-time sequence describe as:

$$x(n) = \begin{cases} a^n, n \geq 0 \\ 0, n < 0 \end{cases}$$ *(10 marks)*

4. Determine the convolution of two finite duration sequences given below:

$$x(n) = \begin{cases} 1 & -1 \leq n \leq 1 \\ 0 & otherwise \end{cases}$$ (25 marks)

$$h(n) = \begin{cases} 1 & -1 \leq n \leq 1 \\ 0 & otherwise \end{cases}$$

5. a) List and explain the properties of convolution *(10 Marks)*
   b) With the aid of a mathematical illustration, define a linear system *(5 Marks)*
   c) With the aid of a diagram, explain the basic Continuous Time (CT) and Discrete Time (DT) signals you were taught. *(10 Marks)*

NNAMDI AZIKIWE UNIVERSITY, AWKA
DEPARTMENT OF ELECTRONIC AND COMPUTER ENGINEERING
ECE 331 – SIGNALS AND SYSTEMS FIRST SEMESTER EXAMINATION
2021/2022

Answer Three (3) Questions only including Q1. Show all your work on the Exam Answer scripts and make sure you justify all your answers (results that are not explained or justified may count less, even if they are correct). Duration: 1Hr 30minutes. God bless!

1. a) As a 300-level student, describe in clear terms the importance of the course signals and system and explain the key terms – Signals and Systems. *(10 Marks)*

   b) Determine whether the following signals are periodic or not: *(10 Marks)*

   i. $x(t) = Sin5\pi t$
   ii. $x(t) = Sin\pi t$

   c) Sketch the continuous-time signal given by *(5 Marks)*

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