THE POLYTECNIC, IBADAN

DEPARTMENT OF COMPUTER ENGINEERING TECHNOLOGY

FIRST SEMESTER 2024/2025 EXAMINATION

COUSRE TITLE: TELECOMMUNICATION ENGINEERING II

COURSE CODE: EEC 316 **CLASS:** HND II

INSTRUCTION: ANSWER ANY FOUR QUESTIONS **TIME ALLLOWED:** 2 HOURS

QUESTION ONE

(a) Using a circuit diagram describe Transmission line parameters. **(4 marks)**

(b) Explain the types of transmission line based on the following;

i. Applications. **(4 marks)**

ii. Physical structure. **(4 marks)**

iii. Frequency and signal type. **(4 marks)**

iv. Communication systems. **(4 marks)**

QUESTION TWO

(a) Derive the Propagation Constant and Characteristic Impedance of the following:

i. High frequency line **(5 marks)**

ii. Low loss line **(5 marks)**

iii. Loss free line **(4 marks)**

(b) A distortionless line has the following parameters; characteristics impedance of 60Ω, wave velocity of 0.6c, where c is the speed of light in a vacuum, α is 20mNp/m, calculate the line parameters R, L, G and C at 100MHz respectively. **(6 marks)**

QUESTION THREE

(a) Highlight Five (5) advantages of Satellite telecommunications. **(5 marks)**

(b) Describe the following Satellites orbits in terms of the orbit:

i. Geosynchronous Earth Orbit (GEO). **(3 marks)**

ii. Medium Earth Orbit (MEO). **(3 marks)**

iii. Low Earth Orbit (LEO). **(3 marks)**

(c) In tabular form show frequency band and frequencies ranges allocated to the telecommunication satellites. **(6 marks)**

QUESTION FOUR

(a) (i) Sketch a typical Amplitude Modulated waveform? **(4 marks)**

(ii) Derive an expression for Total Power of an AM waves **(6 marks)**

(b) A carrier of frequency 1GHz and amplitude 3volts is frequency modulated by a sinusoidal of 500Hz and amplitude 1volts, the frequency deviation is 2KHz, the level of modulating signal changed to 5volts and frequency of 3KHz due to increased, obtain the expression for old and new modulated waves. **(10 marks)**

QUESTION FIVE

(a) Show mathematically, expression for a single tone equation of Amplitude Modulated waves. **(5 marks)**

(b) Using sketch of AM Spectrum/Envelope Waveform derive equation for Modulation Index. **(5 marks)**

(c) The antenna current of an AM transmitter is 8A when only the carrier is sent but increases to 8.93A when the carrier is modulated by a single sine wave, find:

(i) The percentage modulation

(ii) Determine the antenna current when the modulation changes to 0.8. **(10 marks)**

QUESTION SIX

(a) Using a block diagram, explain working principle of an AM Super heterodyne radio receiver. **(5 marks)**

(b) Explain the following terms;

(i) Ground wave (ii) Sky wave (iii) Space wave. **(9 marks)**

(c) A single tone FM signal is given by

$e(t) = 20\cos(7\pi \times 10^5 t + 15\sin 4\pi \times 10^3 t)$ volts Determine the;

(i) Bandwidth (ii) Frequency Deviation

(iii) Carrier swing. (iv) Carrier Frequency **(6 marks)**

EXAMINER: Oluleye O. Akanji

THE POLYTECHNIC, IBADAN
DEPARTMENT OF COMPUTER ENGINEERING TECHNOLOGY
FIRST SEMESTER 2024/2025 EXAMINATION

COURSE TITLE: ELECTRICAL MEASUREMENT AND INSTRUMENTATION III

COURSE CODE: CTE 312
CLASS: HND II
INSTRUCTION: ANSWER ANY FOUR (4) QUESTIONS
TIME ALLOWED: 2 HRS

QUESTION ONE

a. With the aid of suitable diagram, describe the principle of operation of capacitive transducer — 5 marks
b. Derive the sensitivity of a parallel plate Capacitive Transducer when
   i. Area of plates is varied — 2 marks
   ii. Dielectric between plates is varied — 2 marks
c. A parallel plate capacitive transducer has a plate area (l xw) = (80mm x 80mm) and plate spacing (d) = 2.0mm. find
   i. the device capacitance — 2 marks
   ii. the transducer sensitivity — 2 marks
   iii. the displacement (Δd) that cause the capacitance change by 5pF — 2 marks

QUESTION TWO

a. Describe the basic construction of linear potentiometer — 5 marks
b. Mention two (2) applications of potentiometer — 2 marks
c. A basic slide-wire potentiometer has a working battery voltage of 3.0 volts with negligible resistance. The resistance of the slide-wire is 400 Ω and its length is 200cm. A 200-cm scale is placed along the slide wire. The slide-wire has 1 mm scale divisions and it is possible to read up to 1/5 of a division. The instrument is standardized with 1.018 volt standard cell with sliding contact at the 101.8 cm mark on scale. Calculate
   i. Working current — 2 marks
   ii. Resistance of series rheostat — 2 marks
   iii. Measurement range — 2 marks
   iv. Resolution of the instrument — 2 marks

QUESTION THREE

a. State four (4) criteria considered in classifying transducers — 4 marks
b. Briefly explain the construction of Thermistor — 5 marks
c. A thermistor has a resistance of 3980Ω at the ice point (0^0C) and 794 Ω at 50^0C. The resistance-temperature relationship is given by $RT=aR_o\exp(b/T)$, Calculate:

i. The constants a and b 3 marks

ii. The range of resistance to be measured in case the temperature varies from 40^0C to 100^0C 3 marks

QUESTION FOUR

a. With the aid of a neat diagram, explain the principle of operation a thermocouple 5 marks

b. State four (4) types of thermocouple and materials used in forming them 4 marks

c. The output of an LVDT is connected to a 5 V voltmeter through an amplifier of amplification factor 250. The voltmeter scales has 100 divisions and the scale can be read to 1/5th of a division. An output of 2mV appears across the terminals of the LVDT when the core is displaced through a distance of 0.5mm. Calculate

i. the sensitivity of the LVDT 2 marks

ii. the sensitivity of the whole set up 2 marks

iii. the resolution of the instrument in mm 2 marks

QUESTION FIVE

a. Explain the basic principle of operation of a resistance strain gauge 4 marks

b. For strain Gauge, prove that Gauge factor, $Gf = 1 + 2\gamma$ where γ is the Poisson's ratio 5 marks

c. A strain gauge is bounded to a beam 0.1m long and has a cross sectional area of 4cm2. Young Modulus for steel is 207GN/M2. The strain gauge has an unstrained resistance of 240 Ω and gauge factor of 2.2. when a load is applied, the resistance of gauge changes by 0.013 Ω. Calculate

i. the change in length of the steel beam 3 marks

ii. the amount of force applied to the beam 3 marks

QUESTION SIX ✓

a. Mention (5) important parameters that must be considered while selecting a potentiometer 5 marks

b. Briefly describe any five (5) capacitive inductive transducers 5 marks

c. Give reasons why Electrical transducers are useful and highlight the problems associated with them 5 marks

EXAMINER: ENGR. A.A. ONI

THE POLYTECHNIC, IBADAN

DEPARTMENT OF LANGUAGES AND COMMUNICATION STUDIES

FIRST SEMESTER EXAMINATION 2024/2025 SESSION

COURSE TITLE: COMMUNICATION IN ENGLISH IV — TIME: 2 HOURS

COURSE CODE: GNS 401 — CLASS: HND 2

Instruction: *Answer **four** questions in all, one from Section A, two from Section B and one from Section C*

SECTION A (THEORIES AND PRACTICE OF COMMUNICATION)

1. "Communication is essential for societal existence and growth". Discuss this assertion, showing six ways communication is used to serve humanity.
2. "Communication variables are ingredients of effective human interaction". Discuss.
3. With suitable illustrations, discuss any three forms of non-verbal communication.

SECTION B (ORGANIZATIONAL COMMUNICATION)

4. Discuss any seven factors that can hinder communication effectiveness within an organization.
5. i) Explain briefly the concept of meeting within an organization.
   ii) Outline five requirements for a successful meeting.
   iii) The chairperson occupies a central position at a meeting. Outline eight important duties of the chairperson at a meeting.
6. i) Establish the difference between Job interview and Exit interview.
   ii) Identify and explain any six roles expected of an interviewee at a job interview.
7. Write short notes on any three of the following:
   i)Grapevine ii) Downward communication
   iii) Conference iv) Horizontal communication
   v) Minutes of a meeting

SECTION C (LEADERSHIP AND CONFLICT MANAGEMENT)

8. i. Define Leadership
   ii. "It is generally believed that the success or failure of an organization largely depends on the right application of appropriate leadership styles in any given situation". Discuss any three styles of leadership available to a leader in an organization.
9. What are the causes of conflict in an organization and how can it be resolved?
10. With relevant examples, write short notes on any three of the following:
    i)Pseudo-democratic style ii)Win-Lose method
    iii)Laissez-faire style iv) Unstructured interview
    v)Bureaucratic style

THE POLYTECHNIC, IBADAN
DEPARTMENT OF COMPUTER ENGINEERING TECHNOLOGY
FIRST SEMESTER EXAMINATION
2024/2025 ACADEMIC SESSION

COURSE TITLE: COMPUTER GRAPHICS & ANIMATIONS
COURSE CODE: CTE 435
CLASS: HND II
INSTRUCTION: ANSWER ANY FOUR (4) QUESTIONS OUT SIX (6) QUESTIONS
TIME ALLOWED: 2 HOURS

Question One

(a) A graphic designer wants to create a digital image of a line connecting two points on a computer screen. The starting point is A(3,5) and the ending point is B(7,11). Using both the Digital Differential Analyzer (DDA) and Bresenham algorithms, draw the line and explain the step-by-step process for each algorithm. (6 marks)

(b) A two-dimensional object undergoes a series of transformations. First, it is translated horizontally and vertically to a new position. Then, it is rotated by a certain angle about a fixed point. Finally, it is scaled by different factors in the horizontal and vertical directions.

i. Describe the effect of each transformation on the object's position, orientation, and size. (3 marks)

ii. If the original object was a rectangle, what would be its final shape and orientation after all the transformations? (1 mark)

Question Two

(a) Classify the following into hardware and software components of a graphics system: Graphics card, CAD software, Printer, Scanner, Photoshop, Monitor and Illustrator. (2 marks)

(b) A 2D shape has the coordinates A(1,3), B(1,7), C(2,7), D(2,5), E(4,5), and F(4,3).

i. Sketch the 2D shape using an appropriate scale. (2 marks)

ii. Produce a horizontal reflection of the 2D shape. (3 marks)

iii. Translate the shape by dx = -3 and dy = -2. Provide the new coordinates of the shape after translation. (3 marks)

Question Three

(a) Computer graphics have numerous applications across various industries. Describe the role of computer graphics in:

i. Medical imaging and diagnosis (2 marks)

ii. Video game development and animation (2 marks)

(b) Compare and contrast the use of computer graphics in these fields, highlighting their similarities and differences. (3 marks)

(c) Explain the process of scan conversion in computer graphics, and provide four examples of objects that can be scan converted. (3 marks)

Question Four

(a) A 3D graphics artist needs to choose a shading model for a new project. Contrast the following shading models:

i. Constant shading (1 mark)
ii. Gouraud shading (1 mark)
iii. Phong shading (1 mark)

Hence which shading model would you recommend for a project that requires realistic lighting effects? (1 mark)

(b) A computer user wants to upgrade their monitor to improve image quality. Explain the following concepts to help them make an informed decision: (i) Pixel and (ii) Resolution (2 marks)

(c) Briefly compare and contrast any two (2) display technologies. Hence which one might be suitable for a user who wants high contrast and color accuracy? (4 marks)

Question Five

(a) Explain the differences between parallel and perspective projections. (2 marks)

(b) Describe how polygon tables and polygon surfaces can be used to represent 3D objects in computer graphics. (3 marks)

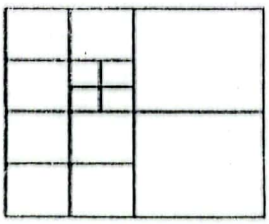
(c) Highlight five graphic hard copy devices and for any one briefly explain (i) How it works (ii) Its advantages and limitations and (iii) the circumstances when it would be more useful. (5 marks)

Question Six

(a) Representing colors as pre-multiplied (R, G, B, A) tuples, calculate the resulting color when (0.0, 0.25, 0.25, 0.5) is composited OVER (1.0, 0.0, 1.0, 1.0). (3 marks)

(b) Draw the RGB color cube, labeling the corners of the cube, color axes, and indicating where gray colors appear. (2 marks)

(c) i. Convert the given quadtree into its equivalent rooted tree. Ensure you show the tree structure clearly. (3 marks)



ii. State two reasons for using a Binary Space Partitioning (BSP) tree in computer graphics. (2 marks)

THE POYTECHNIC IBADAN
DEPARTMENT OF COMPUTER ENGINEERING,
FIRST SEMESTER EXAMINATION, 2024/2025 SESSION.

CLASS: HND II
COURSE TITLE: COMPUTER TECHNOLOGY
COURSE CODE: CTE 431
COURSE UNIT: 3
INSTRUCTION: ANSWER FIVE (5) QUESTIONS IN ALL.
TIME ALLOWED: 2HRS 30MINS

QUESTION ONE

(a) Implement an OR gate using NAND gate/s only. **2mks**
(b) With the aid of a circuit diagram, truth table and symbol, describe the operations of a 3-to-8 decoder. **6mks**
(c) Distinguish between low level and high level languages. **4mks**

QUESTION TWO

(a) Describe the operations of a PC showing the Internal and external buses. **6mks**
(b) With the aid of a relevant diagram, describe the DMA data transfer. **6mks**

QUESTION THREE

(a) Explain the following types of memory devices in a microprocessor- based Computer system:
(i) PROM (ii) EEPROM (iii) EPROM (iv) Dynamic RAMs **4mks**
(b) Draw the internal organization of the 8088 microprocessor, and distinguish it from the 8085 microprocessor. **5mks**
(c) Explain three (3) factors to be considered while improving on the designs of Microprocessors. **3mks**

QUESTION FOUR

(a)(i) Derive the Boolean expression for F where, $F(A,B,C) = \sum (0,3,7)$. **2mks**
(ii) Draw the logic circuit of (i). **2mks**
(iii) Use k – maps to minimize the function F. and draw the resulting logic circuit. **6mks**
(b)(i) Determine the total time required to serially transfer one nibble of data within the computer system at 1 kHz. **1mk**
(ii) What is the time required to transfer the same data in parallel? **1mk**

QUESTION FIVE

(a) Implement an AND gate using NAND gate/s only. **2mks**
(b) Using the symbol, Combinational logic Circuit and the Truth Tables, describe the operations of a 4x1Multiplexer. **6mks**
(c) Describe the operations of the following peripheral devices;
(i) Light Pen (ii) Character recognition (iii) VDU (iv) Line Printers **4mks**

QUESTION SIX

(a) Draw the Seven-segment array of LEDs and with the aid of the Truth table, describe how they can be used to display digits 0-9. **4mks**

(b) What are the functions of the operating systems? **4mks**

(c) Distinguish between the Compilers and Interpreters of the Computer system. **4mks**

QUESTION SEVEN

(a) Mention the importance of circuits' reduction. **4mks**

(b) With the aid of relevant diagrams showing basic data movement, describe the following registers: **6mks**

1. Parallel in /serial out
2. Serial in / serial out
3. Parallel in / Parallel out
4. Serial in / Parallel out

(c) Convert the following decimal numbers to Binary:

(i) 3.5 (ii) 45.25 **2mks**