

FYUGP/5th Sem/Pr./25(NEP)

2025

Four Year Under Graduate Programme (FYUGP)

5th Semester Examination (Under NEP)

(Session 2023-24)

PHYSICS (Minor)

Paper Code : PHSMN MNC-05

[Electronics]

(Practical)

Full Marks : 20

Time : Four Hours

Answer any *one* question on the basis of lottery.

List of questions with the distribution of marks.

1. Draw the forward bias characteristics of a PN junction diode and a Light emitting diode (any given colour) on a single graph paper. Hence find their a.c. resistances (r_{ac}) in the linear portion of the curves. (Take at least ten sets of data for each curve).

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|--------------------------------------|-----|
| (i) Circuit connection - | 1 |
| (ii) Tabulation and data recording - | 6 |
| (iii) Graph - | 3 |
| (iv) Calculation and accuracy - | 2+1 |

(2)

2. (a) Draw the reverse characteristic of a Zener diode and hence find the Zener Breakdown voltage (V_z).

(b) Study the voltage regulation characteristic relating to the variation of line voltage for the load resistance $R_L = 5k\Omega$ (Take at least ten sets of data for each curve).

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|--------------------------------------|-----|
| (i) Circuit connection - | 2 |
| (ii) Tabulation and data recording - | 6 |
| (iii) Graph - | 2+2 |
| (iv) Accuracy - | 1 |

3. Construct and verify truth tables of AND, OR, NOT, and XOR Gates using NAND Gates.

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|---|-----|
| (i) Logic diagram and circuit connection- | 3+3 |
| (ii) Verification of truth tables - | 7 |

(3)

4. Study and draw the input and output characteristics curves of a given Bipolar Junction Transistor in CE configuration and determine the value of β .

(Take at least ten sets of data for each curve).

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| (i) Working formula and circuit connection - | 2 |
| (ii) Tabulation and data recording - | 5 |
| (iii) Graph - | 3 |
| (iv) Calculation and accuracy - | 2+1 |

5. Study the use of OP-AMP as an inverting amplifier using d.c. source. Draw the output voltage vs input voltage curve and verify the theoretical and experimental gain. (Use at least two sets resistances and take at least six different input voltages).

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|--|---|
| (i) Working formula and circuit connection - | 2 |
| (ii) Tabulation and data recording - | 6 |
| (iii) Graph - | 3 |
| (iv) Calculation and accuracy - | 2 |

6. Study the use of OP-AMP as an non-inverting amplifier using d.c. source. Draw the output voltage vs input voltage curve and verify the theoretical and experimental gain. (Use at least two sets resistances and take at least six different input voltages).

- (i) Working formula and circuit connection - 2
- (ii) Tabulation and data recording - 6
- (iii) Graph - 3
- (iv) Calculation and accuracy - 2

7. Construct an inverting amplifier using Op-amp and study its frequency response. (Take at least ten sets of data).

- (i) Working formula and circuit connection - 2
- (ii) Tabulation and data recording - 6
- (iii) Graph - 3
- (iv) Calculation and accuracy - 2

8. Study the use of OPAMP as an adder. Add two dc voltages using Op-amp in inverting mode.

Plot the output voltage as a function of the sum of input voltages. Hence calculate the close loop gain and compare it with the theoretical value. (Take at least six different combinations of input voltages).

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| (i) Working formula and circuit connection - | 2 |
| (ii) Tabulation and data recording - | 6 |
| (iii) Graph - | 3 |
| (iv) Calculation and accuracy - | 2 |

9. Study the use of OPAMP as an adder. Add two dc voltages using Op-amp in non-inverting mode.

Plot the output voltage as a function of the sum of input voltages. Hence calculate the close loop gain and compare it with the theoretical value. (Take at least six different combinations of input voltages).

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|--|---|
| (i) Working formula and circuit connection - | 2 |
| (ii) Tabulation and data recording - | 6 |
| (iii) Graph - | 3 |
| (iv) Calculation and accuracy - | 2 |

10. Study the use of OPAMP as a Differential amplifier using d.c. source.

Plot the output voltage as a function of the input voltage difference. Hence calculate the close loop gain and compare it with the theoretical value. (Take at least six different combinations of input voltages).

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|--|---|
| (i) Working formula and circuit connection - | 2 |
| (ii) Tabulation and data recording - | 6 |
| (iii) Graph - | 3 |
| (iv) Calculation and accuracy - | 2 |

11. Construct and verify the operation of a

- (a) Half Adder using XOR and OR gates
- (b) Full Adder using XOR, OR and AND gates
- (c) 4-bit Binary Adder using Full Adder (with at least two examples).

- (i) Logic circuit diagram and Boolean expressions for Sum and Carry. 1+2+2

- (ii) Truth table and experimental verification. 2+3+3