***Группа \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Студент \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

**Лабораторная работа № 1 ДО**

**ПРОХОЖДЕНИЕ СИГНАЛОВ ЧЕРЕЗ RC-ЦЕПИ**

***Подготовка к работе***

***Перед выполнением подготовки надо изучить все материалы по данной работе. Все пункты подготовки к работе должны быть выполнены в рукописном виде.***

**Частотные характеристики фильтров.**

1. НЧ –фильтр M **= \_\_\_\_\_,** N **= \_\_\_\_\_\_.**

|  |  |
| --- | --- |
|  | *R*1 =\_\_\_\_\_\_\_\_\_\_ кОм,  *С*1 =\_\_\_\_\_\_\_\_\_\_ нФ,  τ1 = \_\_\_\_\_\_\_\_\_\_ мкс,  *f*в = \_\_\_\_\_\_\_\_\_ кГц. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| * *вывести выражение для амплитудно-частотной характеристики H*(*f*)*;*      * *построить график в двойном логарифмическом масштабе;*  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | *f,* кГц | 0,046 | 0,100 | 0,220 | 0,460 | 1,0 | 2,2 | 4,6 | 10 | 22 | 46 | 100 | 220 | | *H* |  |  |  |  |  |  |  |  |  |  |  |  | | *LH*, дБ |  |  |  |  |  |  |  |  |  |  |  |  | |

**Примечание. Точки, кратные 22 и 46, соответствуют 1/3 и 2/3 большого деления.**

* *определить по графику верхнюю граничную частоту f*в*.*

Верхняя граничная частота *f*в = \_\_\_\_\_\_\_\_\_\_\_ кГц

1. ВЧ–фильтр

|  |  |
| --- | --- |
|  | *R*2=\_\_\_\_\_\_\_\_\_\_ кОм,  *С*2=\_\_\_\_\_\_\_\_\_\_ нФ,  τ2 = \_\_\_\_\_\_\_\_\_\_ мкс,  *f*н = \_\_\_\_\_\_\_\_\_\_ Гц. |

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| * *вывести выражение для амплитудно-частотной характеристики H*(*f*)*;*      * *построить график в двойном логарифмическом масштабе;*  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | *f,* кГц | 0,046 | 0,100 | 0,220 | 0,460 | 1,0 | 2,2 | 4,6 | 10 | 22 | 46 | 100 | 220 | | *H* |  |  |  |  |  |  |  |  |  |  |  |  | | *LH*, дБ |  |  |  |  |  |  |  |  |  |  |  |  | |

**Примечание. Точки, кратные 22 и 46, соответствуют 1/3 и 2/3 большого деления.**

* *определить по графику нижнюю граничную частоту f*н*.*

Нижняя граничная частота *f*н = \_\_\_\_\_\_\_\_\_\_\_\_\_ Гц

**Временные характеристики *RC*–цепей.**

1. Временная характеристика схемы с интегрирующим конденсатором.

|  |  |
| --- | --- |
|  | *Um* = \_\_\_\_\_\_\_\_\_\_ B,  *R*1 =\_\_\_\_\_\_\_\_\_\_ кОм,  *С*1 =\_\_\_\_\_\_\_\_\_\_ нФ,  τ1 = \_\_\_\_\_\_\_\_\_\_ мкс. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| * *вывести выражение для временной характеристики u*вых(*t*):   =   |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | t/τ1 | 0 | 0.3 | 0.6 | 0.9 | 1.2 | 1.5 | 1.8 | 2.1 | 2.4 | 2.7 | 3.0 | | *t*, мкс |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  * *построить график на интервале* 3τ1 = мкс,      * *по графику определить* фронт выходного импульса *t*ф   Длительность фронта выходного импульса *t*ф= \_\_\_\_\_\_\_\_\_\_\_ мкс. |

1. Временная характеристика схемы с разделительным конденсатором.

|  |  |
| --- | --- |
|  | *Um* = \_\_\_\_\_\_\_\_\_\_ B,  *R*2 =\_\_\_\_\_\_\_\_\_\_ кОм,  *С*2 =\_\_\_\_\_\_\_\_\_\_ нФ,  τ2 = \_\_\_\_\_\_\_\_\_\_ мкс. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| * *вывести выражение для временной характеристики u*вых(*t*):   =   |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | t/τ2 | 0 | 0,01 | 0,02 | 0,03 | 0,04 | 0,05 | 0,06 | 0,07 | 0,08 | 0,09 | 0,1 | | *t*, мкс |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  * *построить график на интервале t*и = 0,1τ*2 = \_\_\_\_\_\_\_\_\_ мкс;*      * *по графику для заданной длительности импульса определить* Δ*u – спад плоской вершины.*   Спад плоской вершины Δu = \_\_\_\_\_\_\_ B,  Относительный спад плоской вершины δu = \_\_\_\_\_\_\_\_\_ % |