

FINAL TERM EXAMINATION

Spring 2010
PHY301- Circuit Theory

Time: 90 min
M - 60

PHY301 Circuit Theory Question No: 1

If we connect 3 capacitors in parallel, the combined effect of all these capacitors will be

- ▶ equal to the sum of individual capacitances
- ▶ sum of reciprocals of individual capacitors
- ▶ zero
- ▶ product of all

PHY301 Circuit Theory Question No: 2

In an N- type semiconductor material , the majority carrier are

- ▶ holes
- ▶ electrons
- ▶ ions
- ▶ protons

PHY301 Circuit Theory Question No: 3

Semiconductor element in pure form is called

- ▶ extrinsic
- ▶ P type
- ▶ intrinsic
- ▶ N type

PHY301 Circuit Theory Question No: 4

An element with 6 protons and 6 neutrons has atomic no. value

- ▶ 6

► 12

► 18

► 8

PHY301 Circuit Theory Question No: 5

Isotopes of an element have

► Different mass number but same atomic number

► Different atomic number but same mass number

► Same atomic and mass number

► Same no. of neutron

PHY301 Circuit Theory Question No: 6

Which of the following is true about the electrical circuit in your flashlight?

► The battery supplies the charge (electrons) which move through the wires.

► The battery supplies the charge (protons) which move through the wires.

► The battery supplies energy which raises charge from low to high voltage.

► Battery gets energy from circuit.

PHY301 Circuit Theory Question No: 7

If we connect 3 capacitors in series, the combined effect of all these capacitors will be

► equal to the sum of individual capacitors

► the sum of reciprocals of individual capacitors

► zero

► product of all

PHY301 Circuit Theory Question No: 8

which of following relation is true for turn ratio and voltage ratio of transformer

► $N_2/N_1 = V_1/V_2 V_1$

► $N_2/N_1 = V_1/V_2$

► $N_1/N_2 = V_1 V_2/V_2$

► $N_2/N_1 = V_2/V_1$

PHY301 Circuit Theory Question No: 9

Leakage current of semiconductor diode is caused by

► chemical energy

► heat energy

► barrier voltage

► doping impurity

PHY301 Circuit Theory Question No: 10

Rectification is the process of

► converting DC into AC

► increasing output waveform

► converting AC into DC

► converting diode into capacitor

PHY301 Circuit Theory Question No: 11

which rectifier is used to get either positive or negative part of input at output

► half wave rectifier

► full wave rectifier

- ▶ bridge rectifier
- ▶ negative half wave rectifier

PHY301 Circuit Theory Question No: 12

The reference/common point among all the nodes without insertion of any component between them is called

- ▶ node
- ▶ ground
- ▶ loop
- ▶ mesh

PHY301 Circuit Theory Question No: 13

In a Norton's theorem ,norton's resistance I_{nor} is calculated

- ▶ at open terminals of the open circuit
- ▶ by short circuiting the open terminal of the circuit
- ▶ across the load
- ▶ any where

PHY301 Circuit Theory Question No: 14

In a thevenin's theorem , the condition to find V_{th} is

- ▶ to add more load resistance
- ▶ to remove load resistance
- ▶ to convert load into short circuit
- ▶ open circuit the current source

PHY301 Circuit Theory Question No: 15

Using superposition theorem, for a circuit containing independent sources, any remaining voltage source is

- ▶ remain same
- ▶ made zero by replacing them by open circuit
- ▶ made zero by replacing them by capacitor
- ▶ made zero by replacing them by short circuit

PHY301 Circuit Theory Question No: 16

In Norton, s theorem , while calculating R_n

- ▶ Short circuit the current source and open circuit the voltage source
- ▶ open circuit the current source and short circuit the voltage source
- ▶ insert the load
- ▶ just open circuit current source

PHY301 Circuit Theory Question No: 17

The primary function of a filter is to

- ▶ Minimize ac input variations
- ▶ Suppress odd harmonics in the rectifier output
- ▶ Stabilize dc level of the output voltage
- ▶ Remove ripples from the rectified output

PHY301 Circuit Theory Question No: 18

The PIV of a half wave rectifier circuit with a shunt capacitor filter is

- ▶ $2V_m$
- ▶ V_m
- ▶ $V_m/2$
- ▶ $3V_m$

PHY301 Circuit Theory Question No: 19

The ripple factor of a bridge rectifier

- ▶ 1.21
- ▶ 0.406
- ▶ 0.812
- ▶ 1.11

PHY301 Circuit Theory Question No: 20

Zener breakdown occurs

- ▶ Mostly in germanium junctions
- ▶ Due to rupture of covalent bond
- ▶ In lightly doped-junctions
- ▶ Due to thermally –generated minority carriers

PHY301 Circuit Theory Question No: 21

The clipping level is primarily determined by

- ▶ Shape of the input waveform
- ▶ Battery voltage
- ▶ Value of the resistor
- ▶ Knee voltage of the diode

PHY301 Circuit Theory Question No: 22

Without a DC source a clipper acts like a

- ▶ Rectifier
- ▶ Clamper
- ▶ Demodulator

► Chopper

PHY301 Circuit Theory Question No: 23

Avalanche breakdown is primarily dependent on the phenomenon of

► Collision

► Doping

► Ionization

► Recombination

PHY301 Circuit Theory Question No: 24

Three bulbs are connected in series of a battery, what would happen if any one bulb is opened.

► half of current will flow

► same current will flow

► no current will flow

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- ▶ 2/3 current will flow

PHY301 Circuit Theory Question No: 25

The base region of a p-n-p transistor is

- ▶ Very thin and heavily doped with holes
- ▶ Very thin and heavily doped with electrons
- ▶ Very thin and lightly doped with holes
- ▶ Very thin and lightly doped with electrons

PHY301 Circuit Theory Question No: 26

Converting 12v voltage source into current source, value of converted current source source will be

- ▶ 3mA
- ▶ 2mA
- ▶ 48mA
- ▶ 1mA

PHY301 Circuit Theory Question No: 27

In normal operation an n-p-n transistor connected in common-base configuration has

- ▶ The emitter at a lower potential than the base
- ▶ The collector at a lower potential than the base
- ▶ The base at a lower potential than the emitter
- ▶ The collector at a lower potential than the emitter

PHY301 Circuit Theory Question No: 28

The value of I_a for given circuit is

- ▶ $I_a = I_o$
- ▶ $I_a = 3A$
- ▶ $I_a = -3A$
- ▶ $I_a = 6v$

PHY301 Circuit Theory Question No: 29

Across which resistance more voltage is dropped

- ▶ 4Ω
- ▶ 7Ω
- ▶ same across both
- ▶ no voltage drop

PHY301 Circuit Theory Question No: 30

When a diode is reversed biased

- ▶ It will act as short circuit
- ▶ It will act as an open circuit
- ▶ It will act as close circuit
- ▶ maximum current flows

PHY301 Circuit Theory Question No: 31 (M - 2)

In the NPN transistor, what section is made very thin compared with the other two sections?

PHY301 Circuit Theory Question No: 32 (M - 2)

In a reverse biased PN-junction, which current carriers cause leakage current?

PHY301 Circuit Theory Question No: 33 (M - 2)

Sketch the shape of the output voltage waveform for this "clipper" circuit, assuming an ideal diode with no forward voltage drop:

PHY301 Circuit Theory Question No: 34 (M - 3)

Find the value of I_E for transistor if $I_B = 1.5\text{mA}$ and $I_C = 4\text{mA}$

PHY301 Circuit Theory Question No: 35 (M - 3)

What would be the current across the load?

PHY301 Circuit Theory Question No: 36 (M - 3)

Keeping in mind Norton's Theorem find Norton's Resistance R_N . Do not draw the circuit.write each step of calculation.

PHY301 Circuit Theory Question No: 37 (M - 5)

Predict how the operation of this clipper circuit will be affected as a result of the following faults. Consider each fault independently (i.e. one at a time, no multiple faults):

a) Diode D1 fails open:

b) Diode D1 fails shorted:

c) Resistor R1 fails open:

d) Resistor R1 fails shorted:

For each of these conditions, explain why the resulting effects will occur.

PHY301 Circuit Theory Question No: 38 (M - 5)

At what load resistance value will this voltage regulator circuit begin to lose its ability to regulate voltage? Also, determine whether the voltage regulation is lost for load resistance values greater than this threshold value, or less than this threshold value.

PHY301 Circuit Theory Question No: 39 (M - 5)

Find I_x by Norton's Theorem if Norton's Resistance R_N is $5k$ and Norton's current I_{Nor} is $6mA$, draw the Norton's equivalent circuit.