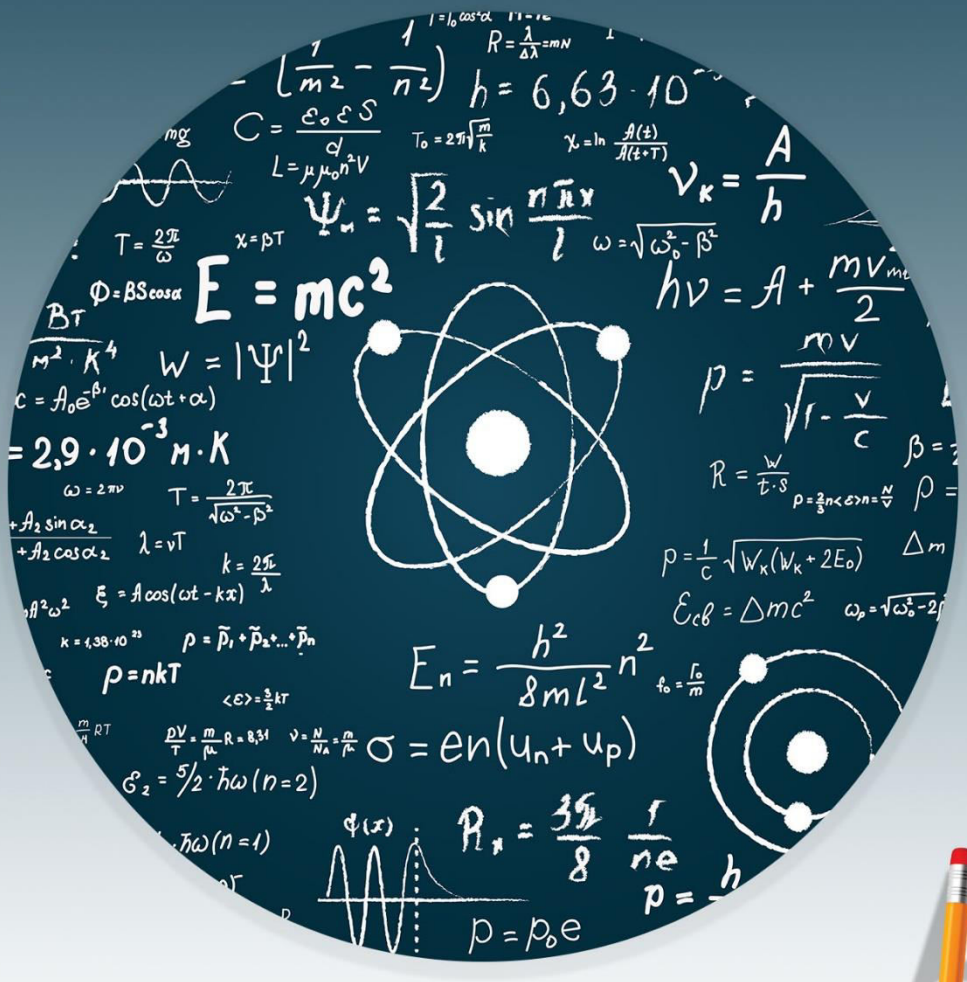
PHYSICS



WORKSHEET-11

STEP

A PROJECT BY PUNJAB GROUP

Worksheet-11

Topics:- Electronics (Complete)

USE THIS SPACE FOR SCRATCH WORK

1. A p-n junction diode is said to be forward biased when:

A. No potential difference is applied across p and n regions

B. A potential difference is applied across p and n regions making p region positive and n region negative

C. A potential difference is applied across p and n regions making p region negative and n region positive

D. A magnetic field is applied in the region of junction

2. When a p-n junction is forward biased then width of depletion region.

A. Increases B. Decreases

C. Remains unchanged D. Is variable

3. Circuit used to convert pulsating D.C into pure D.C is called:

A. Rectifier B. Inverter

C. Filter D. Converter

4. In transistor, which region is the thinnest?

A. Emitter B. Base

C. Collector D. All have same thickness

5. In normally operating common emitter transistor, V_{cc} is:

A. Greater than V_{BB} always

B. Equal to V_{BB}

C. Less then V_{BB}

D. Greater than or equal to V_{BB}

6. $\beta = \frac{I_C}{I_B}$ **is called:**

A. Voltage gain B. Resistance gain

C. Current gain D. Power gain

7. Transistor can be used as:

A. Filter B. Amplifier

C. Switch D. Both B and C

8. A diode characteristics curve is a plot between:

A. Voltage and time B. Current and time

C. Voltage and current D. All of these

9. When a diode is reverse biased, then its resistance is of the order of?

A. ohms B. kilo ohms

C. mega ohms D. micro ohms

10. Which device is used as a rectifier?

A. Resistor B. Op-Amp

C. Gate D. Diode

11. Seven segment display is made of:

A. LED B. Photodiode

C. Transistors D. Photovoltaic cell

12. Which diode is used for detection of light?

A. LED B. Photodiode

C. Transistors D. Photovoltaic cell

13. If a diode is reverse biased, then width of depletion region _____ and potential barrier_____.

A. Increase, Decrease B. Decrease, Increases

C. Decrease, Decreases D. Increase, Increases

14. When transistor acts as OFF switch, V_{BE} is _____V_{CC}.

A. Equal to B. Less than

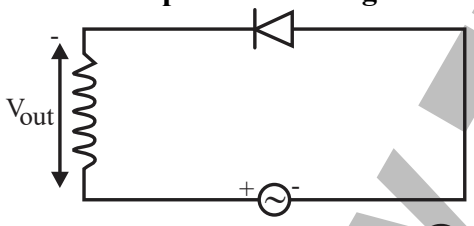
C. Greater than D. Zero

15. The slope of current-voltage characteristic curve of semiconductor diode gives:

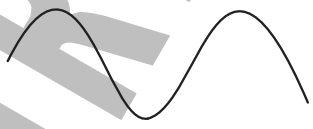
A. Resistance B. Conductance

C. Reciprocal of resistance D. Both B and C

16. What can be the output of following half wave rectifier?



A.  B. 

C. D. 

17. When a photo-voltaic cell is connected across a resistor and exposed to light, its P-terminal behaves as _____ and N-terminal behaves as_____.

A. Positive, Negative B. Negative, Positive

C. Positive, Positive D. Negative, Negative

18. Which region of a transistor contain maximum impurity? Which region has maximum size?

A. Collector, Emitter B. Base, Collector

C. Emitter, Collector D. Emitter, Base

19. The collector current of a transistor is 10 mA and base current is 40 μA. What current gain of transistor is?

A. 500 B. 250

C. 100 D. 750

20. Which expression is not written correctly?

A. $\beta = \frac{I_E}{I_B} - 1$ B. $I_c = \left(\frac{\beta + 1}{\beta}\right) I_B$

USE THIS SPACE FOR SCRATCH WORK

C. $I_c = \left(\frac{\beta}{\beta + 1}\right) I_E$ D. Both A and C

21. The number of input terminals of an ordinary Op-Amp are:

A. Two B. Three

C. Four D. Eight

22. The magnitude of "Open loop gain" of an amplifier is of the order of:

A. $10^5\Omega$ B. 10^5 A

C. 10^5 V D. 10^5

23. An Op-Amp can be used as a:

A. Inverting and non-inverting amplifier

B. Comparator

C. Night switch

D. All of the above

24. The Closed loop Gain "G" of the non-inverting amplifier can be expressed by:

A. $G = \frac{-R_2}{R_1}$ B. $G = 1 + \frac{R_2}{R_1}$

C. $G = \frac{R_2}{R_1}$ D. $G = 1 - \frac{R_1}{R_2}$

25. An Op-Amp will act as an inverting amplifier when the input signal is not connected to:

A. Non-inverting terminal B. Inverting terminal

C. Non-Inverting output D. Inverting output

26. An Op-Amp will not act as a non-inverting amplifier when input signal is connected to the:

A. Non-inverting input B. Inverting input

C. Non-Inverting output D. Inverting out put

27. The gain of an inverting amplifier having external resistance $R_1 = 50\ k\Omega$ and $R_2 = 200\ k\Omega$ respectively will be:

A. 4 B. 20

C. -20 D. -4

28. An OR gates includes:

A. One input and one output

B. Always two inputs and one output

C. Two or more inputs and one output

D. One input and two outputs

29. XOR gate output can only show a value 1 when its inputs are:

A. Same B. Different

C. Both A and B D. None of these

30. The output of an XNOR gate will be zero only when

A. One of its input is at zero B. Both inputs are at zero

C. Both inputs are at one D. None of these

31. The output of AND gate will be zero when

A. Both inputs are at zero
B. At least one input is at zero
C. At least one of its input is at one
D. All of the above

32. The output of AND gate will be one when:

A. Both the inputs are at one B. Both the inputs are at zero
C. Any of its input is at one D. All of the above

33. A NOT gate can be used as an inverter to change

A. 1 to 0 only B. 0 to 1 only
C. 1 to 0 and 0 to 1 D. None of these

34. Which of the following gates corresponds to the truth table given below?

A	B	Y
1	1	0
1	0	1
0	1	1
0	0	1

A. XOR B. OR
C. NAND D. NOR

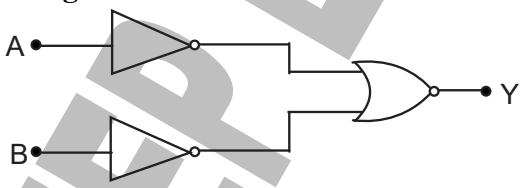
35. For which gate the output will be 1 only if both inputs are different

A. XNOR B. XOR
C. OR D. NAND

36. Following diagram performs the logic function of

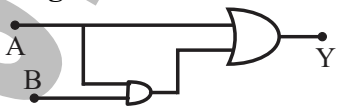
A. AND B. NAND
C. OR D. XOR

37. Name the gate represented by the combination of gates shown in figure:



A. OR B. AND
C. NAND D. NOR

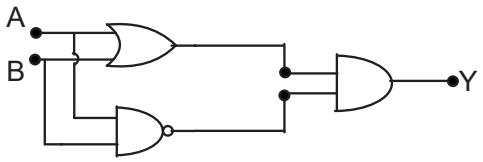
38. Which of the following is the output of the combination of gates shown in figure:



A. A + A . B B. A (1+B)

C. A D. All of these

39. Name the gate represented by the following circuit:



A. OR B. AND

C. NAND D. XOR

40. Which of the following is not correct?

A. $\overline{\overline{A}.\overline{B}} = A + B$ B. $\overline{\overline{A} + \overline{B}} = A.B$

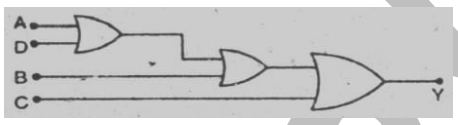
C. $\overline{(\overline{A.B})}.\overline{(\overline{A.B})} = AB + AB$ D. $\overline{1} + \overline{1} = 1$

41. What is the Boolean expression for the logic gate shown?

A. $Y = A + \overline{B}$ B. $Y = \overline{A + B}$

C. $Y = \overline{A} + B$ D. $Y = \overline{A} + \overline{B}$

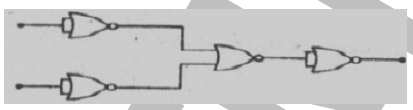
42. What is the Boolean equation of the network figure:



A. ABCD B. A + BCD

C. A + B + C + D D. AB + CD

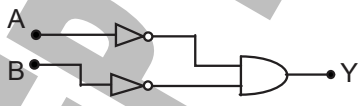
43. Identify the Gate in figure:



A. AND B. XOR

C. NOR D. NAND

44. What is the output in figure:



A. $\overline{A.B}$ B. $\overline{\overline{A.B}}$

C. $\overline{\overline{A.B}}$ D. $\overline{A}.\overline{B}$

45. The Boolean expression $X = \overline{\overline{A}\,B} + \overline{A\,\overline{B}}$ **represents:**

A. OR-gate B. NOR-gate

C. XOR-gate D. XNOR-gate

ANSWER KEY (Worksheet-11)									
1	B	11	A	21	A	31	B	41	C
2	B	12	B	22	D	32	A	42	C
3	C	13	D	23	D	33	C	43	D
4	B	14	A	24	B	34	C	44	D
5	A	15	D	25	A	35	B	45	C
6	C	16	A	26	B	36	A		
7	D	17	A	27	D	37	B		
8	C	18	C	28	C	38	D		
9	C	19	B	29	B	39	D		
10	D	20	B	30	A	40	D		

SOLUTIONS

Chapter – 18 (WS-11)

1. Answer is "B"

Solution:- During forward biasing we connect N-region of diode with "-ve" terminal and P-region with positive terminal.

2. Answer is "B"

Solution:- During forward biasing width of depletion region decreases and current flow due to majority charge carriers.

3. Answer is "C"

Solution:- The circuit which converts pulsating D.C into pure smooth D.C is called a filter.

4. Answer is "B"

Solution:- In a transistor base region is the thinnest region, whereas collector is the thickest.

5. Answer is "A"

Solution:- In normal common emitter configuration $V_{CC} > V_{BB}$ always.

6. Answer is "C"

Solution:- As it is very clear that $\beta = \frac{I_C}{I_B}$ is a ratio of output to input currents so it must be given a name of "current gain".

7. Answer is "D"

Solution:- A Transistor can be used as an amplifier as well as a switch but not a filter.

8. Answer is "C"

Solution:- The characteristic curve for a diode is always plotted between voltage and current.

9. Answer is "C"

Solution:- During reverse biasing, width of depletion region becomes large and it offers an opposition of the order of mega ohms (10^6 Ω) to the majority charge carriers and current from source stops only a very small current in opposite direction flows due to minority charge carriers.

10. Answer is "D"

Solution:- The basic objective of a diode is to convert A.C into D.C which is called rectification so the most basic device as a rectifier must be a diode.

11. Answer is "A"

Solution:- As they conduct electrical pulse into light so seven-segment display must consist of LED's.

12. Answer is "B"

Solution:- Photo-diode is also known as a photo sensor, so must be used for sensing

or detection of light, it can detect light within nano (10^{-9}) seconds.

13. Answer is "D"

Solution:- During reverse biasing width and potential of a potential barrier both increases.

14. Answer is "A"

Solution:-

- When transistor acts as OFF switch, $V_{CE} = V_{CC}$
- When transistor acts as ON switch, $V_{CE} = 0.1\ V \approx 0$

15. Answer is "D"

Solution:- Conductance is reciprocal of resistance.

16. Answer is "A"

Solution:- Half wave rectifier

17. Answer is "A"

Solution:-Photovoltaic cell operation

18. Answer is "C"

Solution:- Impurity trend: E > C > B

Size trend: C > E > B

19. Answer is "B"

Solution:- $\beta = \frac{I_C}{I_B}$

20. Answer is "B"

Solution:-

i. $I_E = I_B + I_C$

$I_E = I_B + \beta I_B$

$I_E = I_B (1 + \beta)$

$\frac{I_E}{I_B} - 1 = I_\beta$

ii. $I_E = I_B + I_C$

$I_E = \frac{I_C}{\beta} + I_C$

$I_E = \frac{I_C + \beta I_C}{\beta}$

$I_E = I_C \left(\frac{1 + \beta}{\beta} \right)$

21. Answer is "A"

Solution:- There are two inputs (a) Inverting (b) Non-inverting input

22. Answer is "D"

Solution:- Open loop gain of OP-Amp is of the order of 10^5.

23. Answer is "D"

Solution:- An operational amplifier can act as an inverting amplifier, a non-inverting amplifier and a comparator as a night switch.

24. Answer is "B"

Solution:- The relation for closed loop gain "G" of the non-inverting amplifier can be expressed as;

$G = 1 + \frac{R_2}{R_1}$, which is "1" greater than inverting amplifier.

25. Answer is "A"

Solution:- When we use an operational amplifier as an inverting amplifier then we simply ground the non-inverting terminal and apply input voltage "V_{in}" at the inverting input through resistance "R_1".

26. Answer is "B"

Solution:- When we use an operational amplifier as an inverting amplifier then we simply ground the non-inverting terminal and apply input voltage "V_{in}" at

the inverting input through resistance "R_1".

27. Answer is "D"

Solution:- $G = -\frac{R_2}{R_1}$

28. Answer is "C"

Solution:- For an OR gate we have two or more inputs and one output.

29. Answer is "B"

Solution:- The Boolean expression for a XOR gate is;

$X = A.\overline{B} + \overline{A}.\mathrm{B}$

Putting A=0 and B=1 or A=1 or B=0, it can be seen that "X" comes out be be 1 such as;

$X = (0).\left(\overline{1}\right) + \left(\overline{0}\right).1 = 0.0 + 1.1 = 0 + 1 = 1$

30. Answer is "A"

Solution:- The Boolean expression for a XNOR gate is;

$X = \overline{A.\overline{B} + \overline{A}.B}$

Which means if any of "A" or "B" is zero, output will be zero.

31. Answer is "B"

Solution:- As Boolean expression of AND gate is;

$X = A.B$; Which means this product will be zero if any of "A" or "B" becomes zero.

32. Answer is "A"

Solution:- It is very simple that product of "A" & "B" being the output of an AND gate can only be "1" if both input are 1.

33. Answer is "C"

Solution:- An inverter or NOT gate can simply interchange 0→1 or 1→0.

34. Answer is "C"

Solution:- Carefully see the input combinations in question

35. Answer is "B"

Solution:- It can be easily proved from the Boolean expression of XOR gate.

36. Answer is "A"

Solution:- $Y = \overline{\overline{A.B}} = A.B$

37. Answer is "B"

Solution:- $Y = \overline{\overline{A} + \overline{B}} = A.B$

38. Answer is "D"

Solution:- $A(1 + B) = A$

39. Answer is "D"

Solution:- If we write the logic expression for this then we get;

$$Y = (A + B).\left(\overline{A.B}\right)$$

$\therefore \overline{A.B} = \overline{A} + \overline{B}$ so above relation can be written as;

$$Y = (A + B).\left(\overline{A} + \overline{B}\right)$$

$$Y = A.\overline{A} + A\overline{B} + B\overline{A} + B\overline{B}$$

$$\left(\therefore A.\overline{A} = 0 \; and \; B.\overline{B} = 0\right)$$

$$Y = A.\overline{B} + \overline{A}.B$$

Which is expression of XOR gate.

40. Answer is "D"

Solution:- Option A, B and C are Boolean Identities

41. Answer is "C"

Solution:- Its very simple; $\overline{A} + B$

42. Answer is "C"

Solution:- Its very simple; $A + B + C + D$

43. Answer is "D"

Solution:- $X = \overline{\overline{A} + \overline{B}} = \overline{A.B}$

44. Answer is "D"

Solution:- Its very simple; $\overline{A}.\overline{B}$

45. Answer is "C"

Solution:- As bar cancel out bar so leaving behind expression $X = A\overline{B} + \overline{A}B$ which belong to XOR gate.

STEP

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