PHYSICS
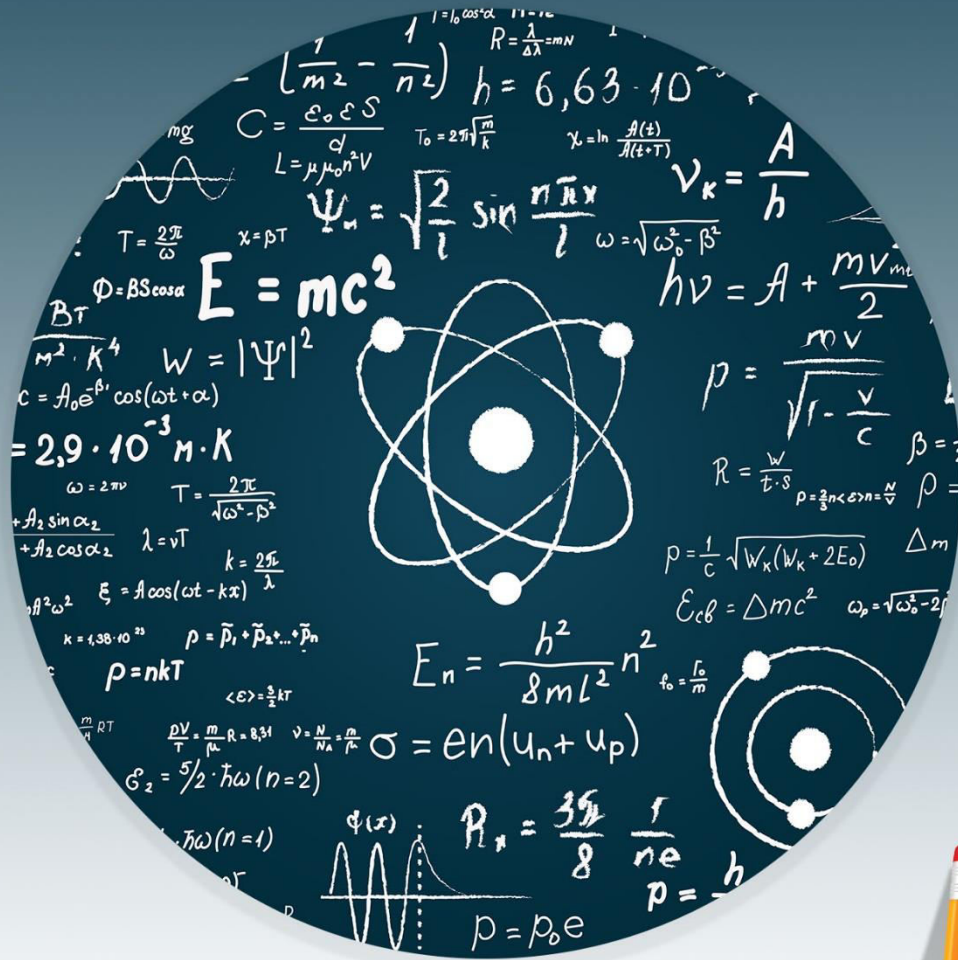
WORKSHEET-7

Worksheet-07

Topics:- Half and Full Wave Rectification, Transformer, Step-up and Step-down Transformer

Q.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

Q.2 **When a P-N junction is forward biased then width of depletion region.**

A) Increases   C) Remains unchanged

B) Decreases   D) is variable

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

A) Rectifier   C) Filter

B) Inverter   D) Converter

Q.4 **If "A" stands for anode and "C" stands for cathode, then which of following is a correct labeled symbolic diagram of a rectifier.**

A)   C)

B)   D) None of these
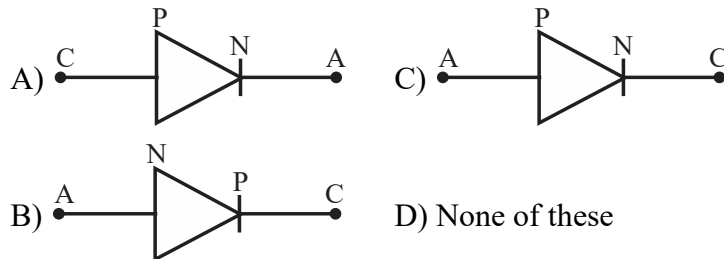
Q.5 **When a diode is reverse biased, then its resistance is of the order of?**

A) ohms   C) mega ohms

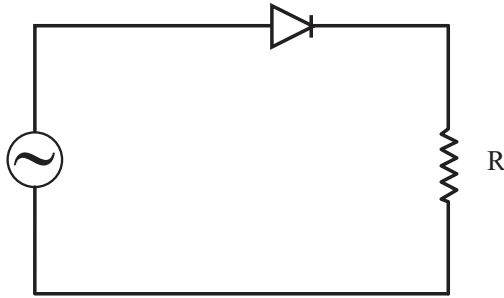B) kilo ohms   D) micro ohms

Q.6 **The time period of output ripple of a full wave rectifier is 40 ms, what will be the input A.C frequency of this rectifier circuit?**

A) 100 Hz   C) 25 Hz

B) 50 Hz   D) 12.5 Hz

Q.7 **The potential drop across the diode in the following**

circuit during the conduction mode of diode is:

A)

B)

C)

D)

**Q.8**   **Which of following is not true about half wave rectifier?**

A) Output ripple has same time period as that of A.C input
B) It produces pure D.C at output

C) Diode conducts only for one half of A.C

D) During reverse Biased mode of rectifier, the output is zero

Q.9   **The similar feature of half wave rectifier and full wave rectifier for same input A.C source is:**

A) Both produces output ripples of same frequency

B) Both uses only forward biased mode of diode

C) Both uses a pair of diodes for operation

D) Both produces pulsating D.C output

**Q.10**   **What can be the output of following half wave rectifier?**

A)   C)

B)   D)
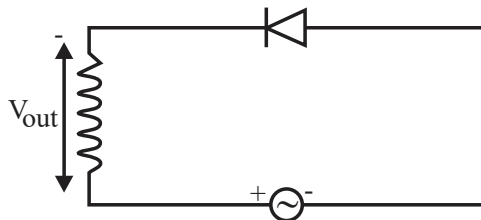
Q.11 Some students were given following instructions.
"Design a circuit to give a full wave rectifier output from
an A.C supply. The positive output must be connected to
a red terminal and negative output to a black terminal."
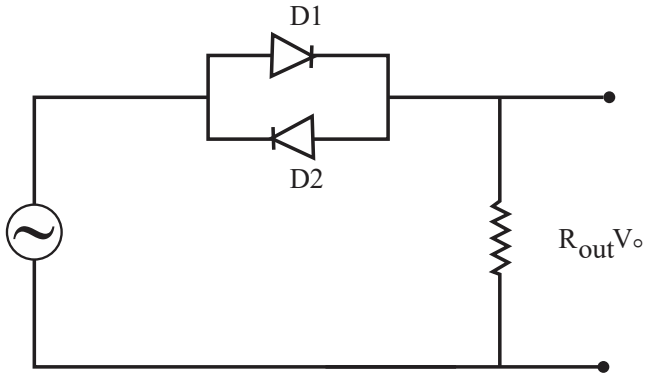Which circuit satisfies the design instructions?

A)   red(+)   black(-)   C)   red(+)   black(-)

B)   red(+)   black(-)   D) None of these
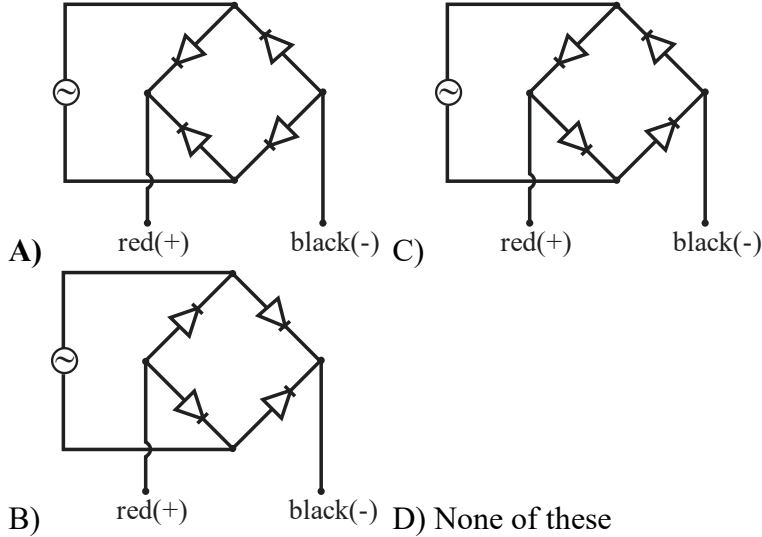
Q.12 The rms current flowing through the following circuit
will be (where diode has negligible forward biased
resistance):

$250\mathrm{Sin}100\pi t$ 100Ω
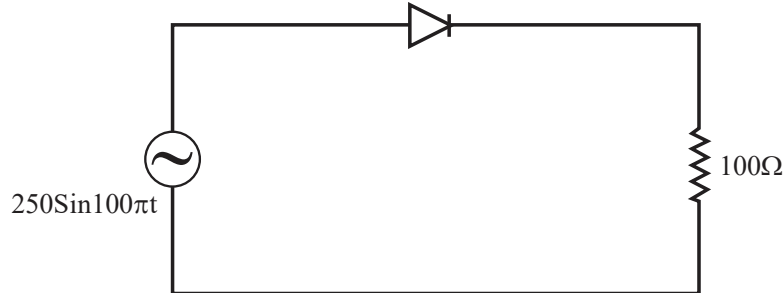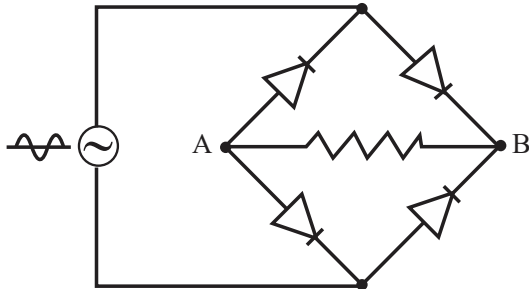
A) $\dfrac{5}{2}A$ C) $\dfrac{5}{4}A$

B) $\dfrac{5}{3}A$ D) $\dfrac{5}{6}A$

Q.13 If the diode D_1 is taken off from the circuit, the output
across resistor will become?

A) Half wave rectified   C) Zero
B) Full wave rectified   D) A.C

Q.14 **The direction of current through the resistor in the circuit shown during negative half of A.C will be:**

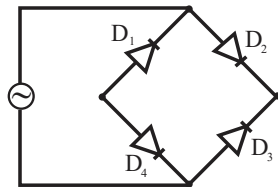A) From A to B
B) From B to A
C) No current flows during negative half
D) Both A and B are possible

Q.15 **If the source frequency is same in all cases, for which circuit out of the following the ripple frequency is more?**
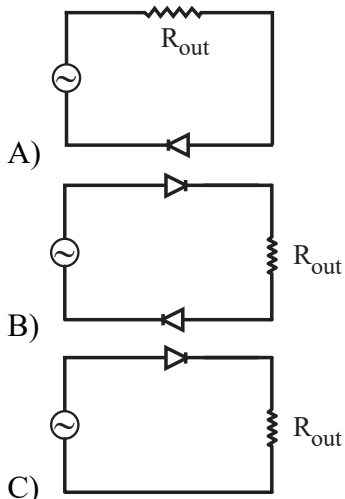
A)

B)

C)
D) Ripple frequency will be same in all cases

Q.16 **What change can be made to convert the following bridge into half wave rectifier?**

A) Replace D_1 by a resistor   C) Replace D_3 by a resistor

B) Replace D_2 by a resistor   **D) All of these**

Q.17   **The ratio of the number of turns in primary and secondary coils of a transformer is 1:20. The ratio of the currents in the primary and secondary coils will be:**

A) 1:20   C) 1:400

B) 20:1   D) 400:1

Q.18   **A step-up transformer is the one which:**

A) Increases voltage level   C) Keeps power level same

B) Decreases current level   D) All of these

Q.19   **In a step-up transformer the turns ratio is found to be 2:1; such a transformer will:**

A) Increase current level   C) Both "A" & "B"

B) Decrease voltage level   D) Decrease current level

Q.20   **A transformer steps down 100 volt to 10 volt to operate a device with an impedance of 2 ohm. Then the current drawn from the mains by the primary of the transformer is:**

A) 50 A   C) 0.5 A

B) 5 A   D) 0.05 A

Q.21   **An ideal step down transformer is connected to main supply of 240 V. It is desired to operate a 12 V, 30 W lamp. What is the current in the primary?**

A) 0.125 A   C) 0.5 A

B) 0.25 A   D) 0.75 A

Q.22   **Referring to previous question, what is the transformation ratio:**

A) 10   C) 20

B) $\dfrac{1}{20}$ D) $\dfrac{1}{10}$

Q.23   **In a step-up transformer, the turn ratio is 1:10. A resistance of 200 ohm connected across the secondary is drawing a current of 0.5 A. What is the primary voltage and current?**

A) 50 V, 1 A   C) 25 V, 4 A

B) 10 V, 5 A   D) 20 V, 2 A

ANSWER KEY (Worksheet-07)					
1	B	11	A	21	A
2	B	12	C	22	B
3	C	13	A	23	B
4	C	14	B		
5	C	15	D		
6	D	16	D		
7	C	17	B		
8	B	18	D		
9	D	19	D		
10	A	20	C		

SOLUTIONS

Unit – 9 (WS-07)

Q.1   Answer is "B"

Solution:- A diode is said to be in forward biased mode if its P-side is connected with high potential and N-side is connected with low potential.
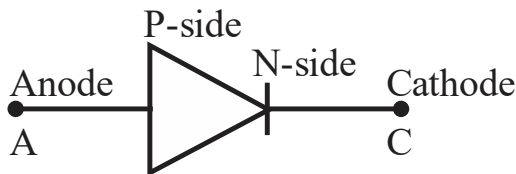
Q.2   Answer is "B"

Solution:- During forward biased mode the resistance and width of potential barrier drops.

Q.3   Answer is "C"

Solution:- RC-filter is used to produce pure D.C by pulsating D.C.

Q.4   Answer is "C"

Solution:- Correct labeled diagram of rectifier is

P-side
N-side
Anode   Cathode
A   C

Q.5   Answer is "C"

Solution:- Forward biased resistance is of the order of few ohms while reverse biased resistance is of the order of mega ohms.

Q.6   Answer is "D"

Solution:-

Step-I

For full-wave rectifier:

$$T_{A.C} = 2T_{ripple} = 80 \ ms$$

Step-II

$$f_{A.C} = \frac{1}{T_{A.C}} = \frac{1}{80 \times 10^{-3}} = 12.5 \ Hz$$

Q.7   Answer is "C"

Solution:- During forward biased mode the potential drop across is negligible.

Q.8   Answer is "B"

Solution:- Half wave rectifier have pulsating D.C at output.

Q.9   Answer is "D"

Solution:- Both rectifiers produces pulsating D.C at output.

Q.10   Answer is "A"

**Solution:-** This rectifier will conduct for negative half of A.C

Q.11   Answer is "A"

Solution:-

Checking for option "A" during (0-T/2)

During this half D_2 and D_4 will be forward biased. When direction of current is traced, it is from $X \rightarrow Y$ on output side. Since conventional current flow from high to low potential, so X will be at +ve potential w.r.t Y. As labeled "X" is made red terminal so this satisfies the design conditions. Similarly check for negative

half, same result will come, so "A" option is correct.
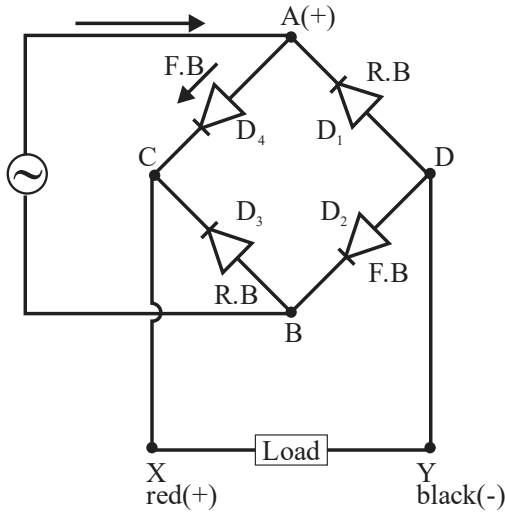
Q.12   **Answer is "C"**

Solution:-

Finding $I_\circ$

$$I_\circ = \frac{\varepsilon_\circ}{R} = \frac{250}{100} = \frac{5}{2} \ A$$

Finding I_{rms}

For half wave rectifier;

$$I_{rms} = \frac{I_\circ}{2} = \frac{\frac{5}{2}}{2} = \frac{5}{4} \ A$$

Q.13   **Answer is "A"**
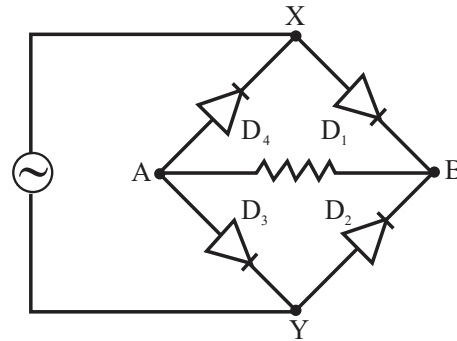
Solution:-

Taking D_1 off will result only one diode in circuit, so it will behave as half wave rectifier.

Q.14   **Answer is "B"**

Solution:-

During negative half, X will become -ve and Y will become +ve. Consequently, D_1 and D_3 will become reverse biased and D_2 & D_4 will become forward biased. The

conventional current will flow from Y toward B and then from B towards A.

Q.15   **Answer is "D"**

Solution:-

All the given circuits are of half wave rectification, so ripple frequency will be same for all.
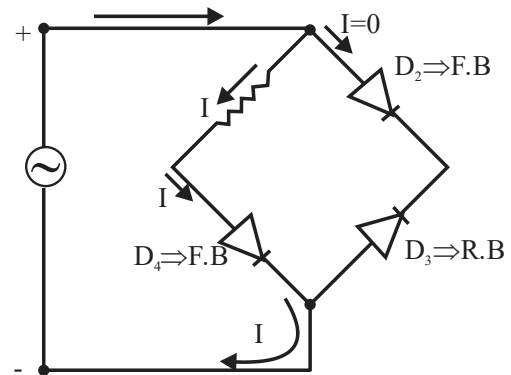
Q.16   **Answer is "D"**

Solution:-

When anyone out of four diodes is replaced by resistor, the circuit behaves as half wave rectifier. For example, if D_1 is replaced by resistor the circuit for both halves of A.C will be:

For +ve half

A positive pulse will be output across resistor during this half. Check for negative half, current won't flow as it will not find any close path.

Q.17 **Answer is "B"**

Solution:- $\dfrac{I_P}{I_s} = \dfrac{N_s}{N_P} = \dfrac{1}{\dfrac{N_P}{N_s}} = \dfrac{1}{\dfrac{1}{20}} = \dfrac{20}{1}$

iii- $\dfrac{I_P}{I_S} = \dfrac{N_S}{N_P}$

Q.18 **Answer is "D"**

Solution:- An ideal step-up transformer:

i.   Increases voltage level

ii. Decreases current level

iii. Keeps $P_{in} = P_{out}$

Q.19 **Answer is "D"**

Solution:- A step-up transformer increases voltage level & decreases current level.

Q.20 **Answer is "C"**

Solution:-

Step-I

$$I_s = \dfrac{V_s}{Z}$$

Step-II

$$\dfrac{I_P}{I_s} = \dfrac{V_s}{V_P}$$

Q.21 **Answer is "A"**

Solution:- $P_{in} = P_{out}$

$V_P I_P = 30 \ W$

Q.22 **Answer is "B"**

Solution:- $\dfrac{N_s}{N_P} = \dfrac{V_s}{V_P}$

Q.23 **Answer is "B"**

Solution:-

i- $V_s = I_s R$

ii- $\dfrac{V_P}{V_S} = \dfrac{N_P}{N_S} = \dfrac{1}{10}$

ST≡P

A PROGRAM BY PUNJAB GROUP