



**Q1: (MCQ), Answer the following questions: (14 Marks)**

1.	<b>In full wave rectification the average value of <math>V_p = 37.7 \text{ V}</math> is .....</b>			
	A	24	B	32
	C	44	D	56
2.	<b>A reverse biased pn junction has .....</b>			
	A	Very narrow depletion layer	B	Almost no current
	C	Very low resistance	D	Large current flow
3.	<b>Blue color of sky is due to.....</b>			
	A	Scattering of light	B	Interference of light
	C	Dispersion	D	Diffraction of light
4.	<b>In double slit interference, the distance between the two neighboring dark fringes is equal to.....</b>			
	A	$L\lambda/d$	B	$m\lambda$
	C	$(m+1/2)\lambda$	D	$2m+1(\lambda/2)$
5.	<b>In double slit experiment we observe.....</b>			
	A	Interference fringes only	B	Diffraction fringes only
	C	Both interference and diffraction fringes	D	Polarized fringes
6.	<b>..... Phenomenon proves that nature of light is transverse</b>			
	A	Interference	B	Diffraction
	C	Scattering	D	Polarization
7.	<b>In n-type materials, the minority carriers are .....</b>			
	A	Free electrons	B	Holes
	C	Protons	D	Mesons
8.	<b>Type-II of superconductors are usually.....</b>			
	A	Alloys	B	Semiconductors
	C	Insulators	D	Paramagnetic
9.	<b>A distribution of electric charge at rest creates.....</b>			
	A	Magnetic field	B	Electric field
	C	Electromagnetic field	D	lines field
10.	<b>The magnetic force vector is..... to the magnetic field.</b>			
	A	Perpendicular	B	Parallel
	C	Helical	D	Intersect
11.	<b>Addition of pentavalent impurity to a semiconductor</b>			
	A	Free electrons	B	Holes
	C	Valence electrons	D	Bound electrons
12.	<b>Fringe width is inversely proportional to the.....</b>			
	A	Separation between the two slits	B	Order of the fringe
	C	Wavelength of light use	D	Distance between slits and screen
13.	<b>The width of depletion region of a diode</b>			
	A	Increases under forward bias	B	Is independent of applied voltage
	C	Increases under reverse bias	D	None of these

14. If the initial velocity of the charged particle has a component parallel to the magnetic field  $B$ , the resulting trajectory will be.....

A	A helical	B	parallel
C	A perpendicular	D	None of these

**Q2: Complete the following questions: Write the steps of the solution (16 Marks)**

1. A two-slit interference experiment in which the slits are **0.200 mm** apart and the screen is **1.00 m** from the slits. The  $m=3$  bright fringe in the figure... is **9.49 mm** from the central fringe. The wavelength ( $\lambda$ ) of the light is.....
2. For diode circuit ( $R_{\text{limit}} = 1 \text{ k}\Omega$ ,  $V_{\text{bias}} = 10 \text{ V}$ ,  $r_d = 10 \Omega$ ), the forward voltage and forward current for each of the diode models (three models) are ....., and the voltage across the limiting resistor in each case is.....
3. The reflected ray in air is completely polarized when the angle of incidence is **48.0°**. The index of refraction of the reflecting material is.....
4. A viewing screen is separated from a double slit by **4.80 m**. The distance between the two slits is **0.030 mm**. Monochromatic light is directed toward the double slit and forms an interference pattern on the screen. The first dark fringe ( $m=0$ ) is **4.50 cm** from the center line on the screen. The wavelength of the light is ....., while the distance between adjacent bright fringes is.....

**Q3: Answer the following questions: (30 Marks)**

1. Write short notes about: Length contraction according to Special Theory of Relativity?
2. Deduce: the Magnetic Field Due to a Current in a Long Straight Wire?
3. Explain: Polarization by Absorption?
4. Write short notes about: Superconductivity and two types of superconductivity materials?

**\*\*End of Exam\*\***  
**With My Best Wishes**  
**Dr/ Walid Ismail**



**Answer the following questions**

1- (a) Find the solution set to the following:  $2x + 1 < 3$  and  $3x + 10 < 4$ .

(b) Let  $f(x) = x^2 - 5$ . Find the range.

2- (a) If  $f(x) = \frac{1}{x^2 - 5}$ . Find the domain of  $f$ .

(b) Find  $\lim_{x \rightarrow \infty} \frac{x^3 + 1}{3x^3 - 4x + 5}$ , if it exists.

3- Choose the correct answer:

(I) Let  $f(x) = \frac{x}{|x|}$ . Then  $\lim_{x \rightarrow 0} f(x) = \dots$

(a) 1                      (b) does not exist                      (c) -1

(II) Let  $f(x) = \frac{1}{x}$ . Then  $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} = \dots$

(a)  $-\frac{1}{x^2}$                       (b)  $\frac{1}{x^2}$                       (c)  $\frac{1}{2\sqrt{x}}$

4- (a) let  $f(x) = x^3$ . Find the derivative of  $f(x)$ .

(b) Find the integral  $\int (x^2 - 5x + 1)(2 - 3x) dx$ .

5- (a) Let  $y = \sqrt{x}(x + 1)$ . Find  $\frac{dy}{dx}$ .

(b) Find the area of the combined region bounded by the curve  $y = x^3 - 5x^2 + 6x$  and the x-axis.

*With my best wishes*  
**Prof. Dr. Osama Abo-Seida**

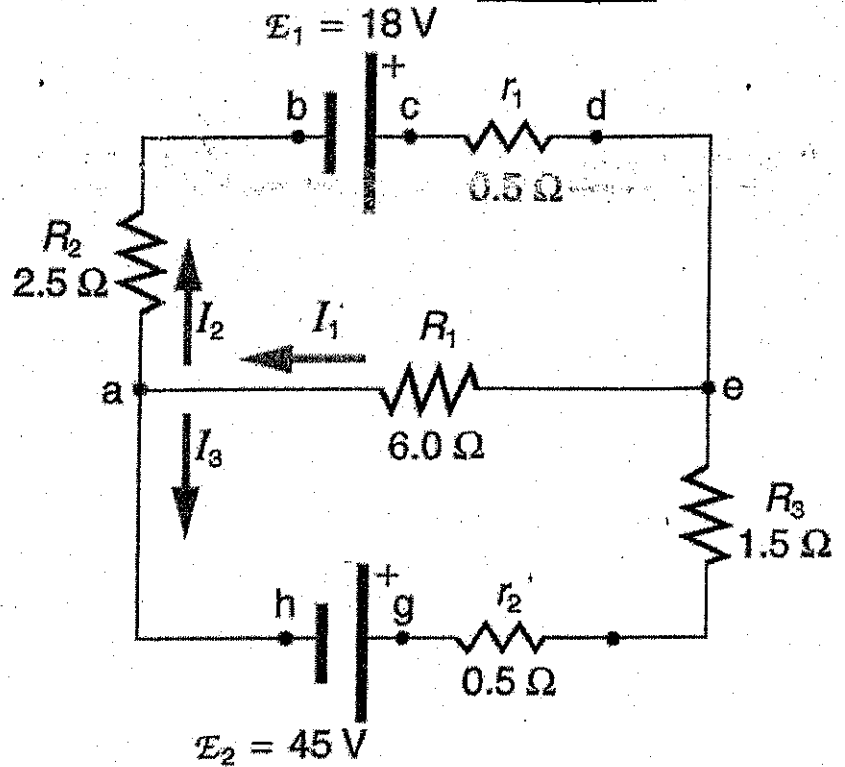


(40 degree)

**First Part**

**Answer the following questions:**

1. Find the currents flowing in the circuit



2. Write short notes about:

- a. Crystal Diode Equivalent Circuits.
- b. Diode characteristic curve.
- c. Rectifiers.

3. Compare between intrinsic and extrinsic semiconductors.

4. Compare between the bipolar junction transistor and field effect transistor showing types of them and the characteristic curves.

5. What is the Operational Amplifier (OP-Amp), giving at least five applications of non-inverting one.

Please see the second part

With my best wishes

Dr. Mahmoud Saad



اسم المقرر : **Electronics**  
 الدرجة : **60** درجة

للعام الدراسي **2020/2019**  
 الترم الاول

امتحان الفرقة : **الاولى** حاسبات  
 الزمن : **3** ساعة

يتم الاجابة عن هذا الجزء في نفس الورقة

**Second Part**

**Answer the following questions**

**(20 degree)**

**(2 degree for each question)**

**Choose the correct answer with an explanation if found:**

<p>1- A diode has</p> <p>a) three depletion region                      b) two depletion region                      c) one depletion region                      d) none of the above</p>	<p>2- The most widely used rectifier is</p> <p>a) half-wave rectifier                      b) centre-tap full-wave rectifier                      c) bridge full-wave rectifier                      d) none of the above</p>																														
<p>3- Diode characteristic curve is a plot between</p> <p>a) current and time                      b) voltage and time                      c) voltage and current                      d) both a and b</p>	<p>4- Smoothing circuit do not used in amplifiers</p> <p>a) True                      b) False</p>																														
<p>5- A transistor has</p> <p>a) one terminal                      b) two terminals                      c) three terminals                      d) four terminals</p>	<p>6- The Emitter of a transistor is ..... doped</p> <p>a) heavily                      b) moderately                      c) lightly                      d) none of the above</p>																														
<p>7- Which logic gate has the following truth table</p> <p>a) An exclusive NOR gate.                      b) A two-input OR gate.                      c) An exclusive OR gate.                      d) A two-input AND gate.</p> <table border="1"> <thead> <tr> <th>A</th> <th>B</th> <th>Out</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> </tr> </tbody> </table>	A	B	Out	0	0	0	1	0	0	0	1	0	1	1	1	<p>8- Which logic gate has the following truth table</p> <p>a) An exclusive NOR gate.                      b) A two-input NOR gate.                      c) An exclusive OR gate.                      d) A two-input NAND gate.</p> <table border="1"> <thead> <tr> <th>A</th> <th>B</th> <th>Out</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> </tr> </tbody> </table>	A	B	Out	0	0	1	1	0	0	0	1	0	1	1	0
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<p>9. Majority carriers in p-semiconductor are:</p> <p>a) electrons                      b) holes                      c) electrons and holes                      d) none of the above</p>	<p>10. In PNP transistor, the base is :</p> <p>a) L-semiconductor                      b) P-semiconductor                      c) P-semiconductor and N-semiconductor                      d) none of the above</p>																														

<p>11. Output voltage can be limited bigger than 0.7 by</p> <p>a) voltage dropper b) diode limiter c) diode rectifier d) None of the above</p>	<p>12. A semiconductor is formed by ..... bonds.</p> <p>a) Ionic b) Electrovalent c) Co-ordinate d) None of the above</p>
<p>13. Transistor as amplifier can be</p> <p>a) common emitter b) common collector c) common base d) all of the above</p>	<p>14- Gate that is also known as inverter is called</p> <p>a) OR b) NOT c) XOR d) NAND</p>
<p>15. The <math>\beta_{dc}</math> of the transistor is the ratio of <math>I_c</math> and <math>I_b</math></p> <p>a) True b) False</p>	<p>16. The input control parameter of a JFET is .....</p> <p>a) gate drain voltage b) source voltage c) drain voltage d) none of the above</p>
<p>17. A crystal diode utilises ..... characteristic for rectification</p> <p>a) reverse - forward b) forward- reverse c) either reverse or forward d) none of the above</p>	<p>18. The current across a pn junction is due to .....</p> <p>a) Minority carriers b) Majority carriers c) Junction capacitance d) None of the above</p>
<p>19. A zener diode is always ..... connected.</p> <p>a) reverse - forward b) forward- reverse c) either reverse or forward d) none of the above</p>	<p>20. A MOSFET has ..... terminals</p> <p>a) two b) five c) four d) none of the above</p>

**End of the test**  
**With my best wishes**  
**Dr. Mahmoud Saad**