a) What is the addressing mode used in each line of the above assembly lines? *(4 Marks)*

b) Show the contents of the missing locations in the shown part of memory after the execution of the above assembly lines. *(4 Marks)*

ii) Check if the jump to `Next` will occur or not in the following cases: *(6 Marks)*
(Note: answer with occur or not occur, and also write the reason)

a)
```
MOV AX,92C7H
CMP AX,4B2CH
JG NEXT
```

b)
```
MOV AL,0B7H
ADD AL,53H
JC NEXT
```

c)
```
MOV CX,3
DEC CX
JCXZ NEXT
```

Question 3 *10 Marks*

Write the assembly code that: *(8 Marks)*

- adds and counts the even and odd numbers in the following series of byte size data:

  43, 56, 18, 71, 36, 67, 92, 0, 31, 22, 0

- stores the sum and count of the even numbers in CL and CH, respectively
- stores the sum and count of the odd numbers in DL and DH, respectively
- stops when the number 0 is read

then show the contents of CX and DX after the execution of the assembly code. *(2 Marks)*

Question 4 *10 Marks*

Choose the correct answer to each of the following statements: *(1 Mark for Each Point)*
(Note: multiple choices are not allowed)

1. The computing machine which can be considered the first general-purpose computer is .....

   [A] Colossus
   [B] Z3
   [C] ENIAC
   [D] Abacus

2. The maximum size of memory that can be accessed in the real mode operation is .....

   [A] 1 MB
   [B] 64 KB
   [C] 4 MB
   [D] 256 KB

3. The first microprocessor in Intel which has a numeric coprocessor is .....

   [A] Intel 80386
   [B] Intel 80486
   [C] Intel Pentium
   [D] Intel Pentium Pro

4. Which of the following can be considered a starting address for a memory segment in the real mode operation?

   [A] 7A269 H
   [B] 2350 H
   [C] B659D0 H
   [D] non of the previous

5. The main processing unit in Intel 8086 which is responsible for updating control flags is .....

   [A] EU
   [B] BIU
   [C] ALU
   [D] non of the previous

6. In ....., the computer system performance is optimized with more focus on hardware.

   [A] CISC
   [B] MIPS
   [C] RISC
   [D] non of the previous

7. Assume that the machine code of `MOV AL,06H` is B406 H. The value B406 H is stored in the .....

   [A] data segment
   [B] extra segment
   [C] code segment
   [D] stack segment

8. Consider CF = 1 and AL = 10100011 B. After the execution of `RCR AL,2` .....

   [A] CF = 1 and AL = 01000111 B
   [B] CF = 1 and AL = 11101000 B
   [C] CF = 0 and AL = 10001110 B
   [D] CF = 0 and AL = 10001111 B

9. ..... can be considered as a suitable combination of segment:offset registers.

   [A] CS:SI
   [B] DS:BX
   [C] ES:BP
   [D] non of the previous

10. IF SP = 582C H, the offset address of the first location in the stack to pop data from is ..... after the execution of the following assembly line: `PUSH AX`

    [A] 582E H
    [B] 582C H
    [C] 582A H
    [D] 5828 H

	Assiut University- Faculty of Science Frist Semester- Final Exam 2025-2026 Physics Department	Program: physics Level : (3) Date: 15/1/2026 Time: 3 h	
Course Title: Electronics			Code: 361 P
Instructors: Dr. Amina Abdelsamea Abozeed			
Important:	No. of pages: 6	No. Of questions: 2	Total Mark:50 degree

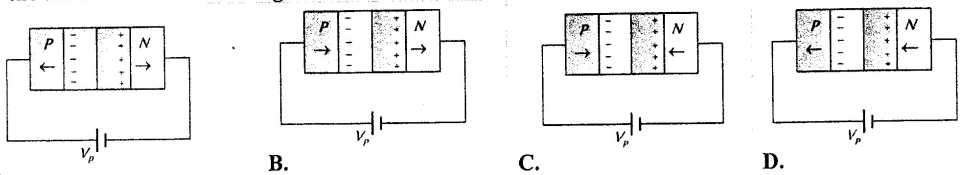
Plank constant (h): 6.6×10^{-34} J/sec	Boltzmann constant (k): 1.38×10^{-23} J/K
Speed of light (c): 3×10^{8} m/sec	Charge of electron or proton (e): 1.6×10^{-19}C
Knee voltage $(V)_{Si}$=0.7 V, $(V)_{Ge}$: 0.3 V	$(V)_{red}$=1.8 V, $(V)_{GaAs}$=1.2 V

A. Choose the correct answer: (22 Marke)

1) The electrical resistance of depletion layer is large because:

A. It has no charge carriers | B. It has a large number of charge carriers | C. It contains electrons as charge carriers | D. It has holes as charge carriers

2) In the case of forward biasing of PN-junction, which one of the following figures correctly depicts the direction of flow of charge carriers:



A. B. C. D.

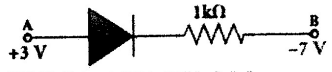
3) When a PN junction diode is reverse biased:

A. Electrons and holes are attracted towards each other and move towards the depletion region
B. Electrons and holes move away from the junction depletion region
C. Height of the potential barrier decreases
D. No change in the current takes place

4) On increasing the reverse bias voltage to a large value in a PN-junction diode, current:

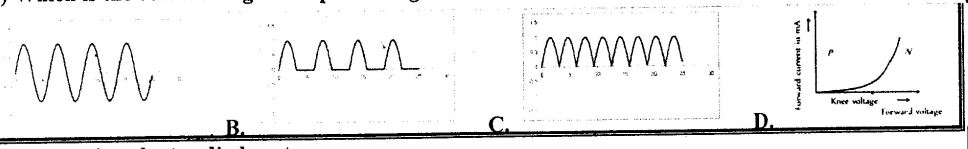
A. Increases slowly | B. Decreases slowly | C. Suddenly increases | D. Remains fixed

5) Consider an ideal junction diode. Find the value of current flowing through AB?



A. zero | B. 1 mA | C. 10 mA | D. 20 mA

6) Which is the correct diagram representing a full-wave rectifier?



A. B. C. D.

7) The semiconductor diode acts as:

A. Capacitor | B. Inductor | C. Internal resistance | D. Resistance

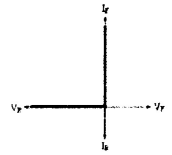
8) Acceptor type impurity is found in:

A. Monovalent elements B. Divalent elements C. Trivalent elements D. Pentavalent elements

9) ..... is made of GaAsP.

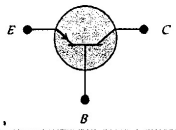
A. Solar cell B. Zener diode C. Photo diode D. Light emitting diode

10) The following I-V characteristic, which diode model represent?



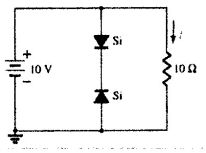
A) Ideal model
B) Simplified model
C) actual model
D) None of the these

11) The symbol given in figure represents:



A) Forward biased PN junction diode
B) Reverse biased NP junction diode
C) PNP transistor
D) NPN transistor

12) Determine the current I for the given circuit?



A) Zero A
B) 1 A
C) 0.93 A
D) 0.86 A

13) In an NPN transistor, which terminal is the collector?

A. The portion connected to the large number of holes B. The portion connected to the positive voltage supply C. The portion connected to the emitter D. The part that absorbs electrons

14) What operational mode is a transistor in when it is not conducting current?

A. Active B. Cut-off C. Saturation D. Linear

15) The primary function of a bipolar transistor is to:

A. Rectify AC to DC B. Amplify current C. Store electrical charge D. Control voltage

16) Which of the following statements about the base current in a bipolar transistor is true?

A. It is always larger than the collector current. B. It is independent of the transistor configuration. C. It controls the collector-emitter current. D. It always flows in the opposite direction to the emitter current.

17) The purpose of the emitter in a bipolar transistor is primarily to:

A. Control the collector current B. Provide input for the base current C. Inject majority carriers into the base D. Capture excess carriers

18) If l_1, l_2, l_3 are the lengths of the emitter, base and collector of a transistor then:

A. $l_1 = l_2 = l_3$ B. $l_3 < l_2 > l_1$ C. $l_3 < l_1 < l_2$ D. $l_3 > l_1 > l_2$

19) For transistors, the current amplification factor is 0.8. The transistor is connected in common emitter configuration. The change in the collector current when the base current changes by 6 mA is:

A. 6 mA B. 24 mA C. 4.8 mA D. 8 mA

20) In a transistor in CB configuration, the ratio of power gain to voltage gain is:

A. α	B. β	C. $\alpha\beta$	D. β/α

21) What happens when a bipolar transistor is in cut-off mode?

A. It acts as an closed switch	B. It acts as an open switch	C. It amplifies the input signal	D. It is turned off

22) In the CB mode of a transistor, when the collector voltage is changed by 0.5 volt. The collector current changes by 0.05 mA. The output resistance will be:

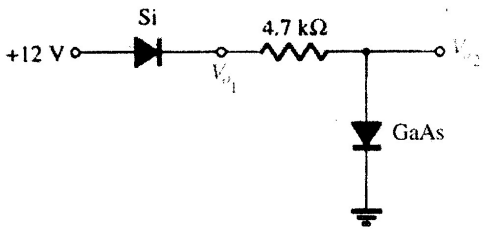
A. $2.5\ K\Omega$	B. $5\ K\Omega$	C. $10\ K\Omega$	D. $20\ K\Omega$

B. Answer the following questions: **(28 Marke)**

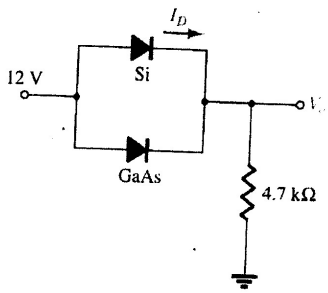
1. How does temperature affect the performance of bipolar transistors?

2. How does temperature affect the performance of a semiconductor diode?

3. Determine V_{o1} and V_{o2} for the given circuit?

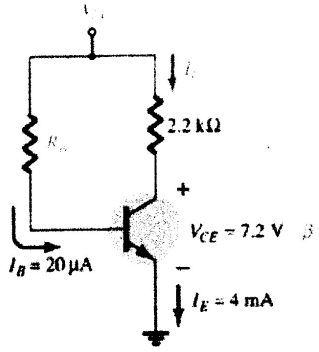


4. **Determine V_o and I_D for the following circuit?**

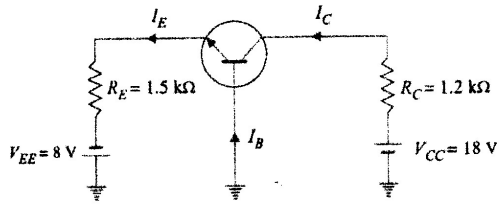


5. **A full-wave bridge rectifier with a 120-V rms sinusoidal input has a load resistor of 1 kΩ.**
   a. **If silicon diodes are employed, what is the dc voltage available at the load?**
   b. **Find the maximum current through each diode during conduction?**
   c. **What is the required power rating of each diode?**
   d. **Determine the output waveform?**

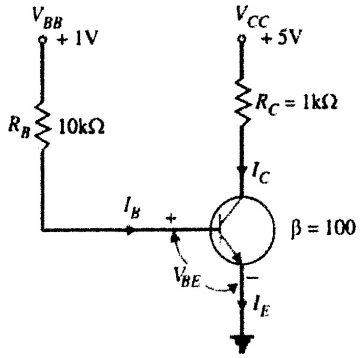
6. From the circuit shown, determine: I_C, β, R_B, V_{CC}. Assume the transistor to be silicon transistor.



7. For the common base circuit shown, determine: I_C and V_{CB}. Assume the transistor to be silicon transistor and the current gain factor $\alpha = 1$



8. For the circuit shown in figure. Find, I_B, V_{CE}, V_B, I_C , and the transistor power dissipation. Assume the transistor to be silicon transistor and $\beta = 100$?



End of Exam

Best Wishes/ Dr. Amina Abdelsamea Abozeed

	Assiut University Faculty of Science Physics Department	Final Exam Environmental Physics Code : 383 P	Date : 21/1/2026 Level : Three Time : 3Hour	

Answer Five questions only: (every question 10 Marks)

Question (1):

Choose the correct answer (10 Marks)

١- The upper part of the stratosphere contains .....

a. carbon dioxide b. high energy c. ozone d. non of above

2- Γ*d is called* .....

a. The virtual temperature b. The potential temperature
c. The dry adiabatic lapse rate d. The geopotential at any point in the Earth's atmosphere.

3- Rainbows are created by the .....of light in water droplets.

a. reflection b. increasing c. refraction d. scattering

4-- ..... is not really a layer, but rather an electrified region within the upper atmosphere

a. Mesosphere b. High energy c. Ozone d. a and c

5- A ring of light encircling and extending outward from the sun or moon is called .....

a. Rainbows b. Halo c. Ozone d. Twilight

Question (2): Put (true) or (false) and correct the error (10 Marks)

1. The method of transferring heat by radiation does not require a link between the source of heat and the object to which the heat is transmitted. ( )
2. Both air pressure and air density decrease with increasing altitude. ( )
3. The oceans act as a huge reservoir or CO_2 ,as phytoplankton in surface water. ( )
4. The removal of CO_2 from the atmosphere takes place during photosynthesis. ( )
5. Ozone (O_3) in the stratosphere protects life from harmful infrared radiation. ( )
6. Carbon dioxide and water vapor release the energy out of the earth and decrease the temperature of it. ( )

أنظر خلفه

Question (3):

٤

A) Complete the following sentences : (5 Marks)

1) In β-, emission one of the ..... , In the nucleus changes into a .....

2) In the atmosphere, the solar radiation is attenuated by ..... and .....

3) Enthalpy (h) of a unit mass of the material, is defined by .....

B) Manufacturing of Photovoltaic **Solar cells** as a clean energy, How do Photovoltaic Solar Cells work and illustrate the operation of basic of PV cells. (5 Marks)

Question (4) :

I) Write a short brief on Green Hydrogen and illustrate. (6 Marks)

II) Explain how the earth's atmospheric greenhouse effect work (4 Marks)

(10 Marks)

Question (5) :

A) The main differences between **Rayleigh** scattering and **Mie** scattering. (4 Marks)

B) Explain by using equations, **types of Beta** particles. (4 Marks)

C) write a short brief on of the following ,Conference objectives and most important recommendations of **(COP27) 2022 for climate changes** at **Sharm El Sheikh Egypt.** (2 Marks)

Question (6) :

(10 Marks)

A) The geopotential at any point in the Earth's atmosphere Potential Temperature(Θ). (4 Marks)

B)) What is **Proton- Proton cycle** of the atmospheric energy? Explain by using equations (4 Marks)

C) Quantitative Description of Radiation and illustrate Radiometric Definitions

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The End of Questions

best wishes, Dr. Mohamed Mansor

	Assiut University- Faculty of Science Final Exam 2025 - 2026 Physics Department	Program : Physics Date : 13 / 1 / 2026 Tuesday : (9-12)
Course Title : Solid States Physics		Code : P353
Instructor: Dr. Abdel-Rahim Hassan Moharram		Level : 3
Important: No. of Pages : 5	No. of Questions : 4	Total Mark: 50 degree

Answer All Questions

First Question:- ..... **[20 Degrees]**

1- Electric field (E) and magnetic field (B) are in opposite directions. An electron moves with velocity (v) and angle (θ) with the fields, the electric force is .....

a)- evE *b*)- eE *c*)- $evE\ cos\theta$ *d*)- $evE\ sin\theta$

2- Referring to Question #1, the magnetic force acting on the electron is

a)- evE *b*)- $evB\ sin\theta$ *c*)- $evB\ cos\theta$ *d*)- $evE/sin\theta$

3- Referring to Question #1, the magnetic force is maximum when .....

a)- $\theta = 90°$ *b*)- $\theta = 30°$ *c*)- $\theta = 60°$ *d*)- $\theta = 0°$

4- Referring to Question #1, the magnetic force equals zero when .....

a)- $\theta = 0°$ *b*)- $\theta = 30°$ *c*)- $\theta = 60°$ *d*)- $\theta = 90°$

5- Energy released from the reaction $Na^+ + Cl^- \rightarrow NaCl$ is the ..... energy.

a)- cohesive *b*)- ionization *c*)- kinetic *d*)- electron affinity

6- Energy released from a neutral atom when it gains an extra electron is the ... energy.

a)- cohesive *b*)- ionization *c*)- kinetic *d*)- electron affinity

7- For a face centered cubic, the total numbers of atoms inside one unit cell equals.....

a)- 1 atom *b*)- 2 atoms *c*)- 3 atoms *d*)- 4 atoms

8- For a face centered cubic crystal, the number of nearest neighbors equals .....

a)- 6 atoms *b*)- 8 atoms *c*)- 12 atoms *d*)- 4 atoms

9- The maximum numbers of electrons fill the $3d$ shell equals .....

a)- 6 electrons *b*)- 8 electrons *c*)- 10 electrons *d*)- 12 electrons

10- The bonds between two nitrogen atoms in nitrogen gas is .....
a)- van der Waals *b*)- hydrogenic *c*)- covalent *d*)- metallic

11- The bond between two H_2O molecules inside ice is .....
a)- ionic *b*)- hydrogenic *c*)- metallic *d*)- covalent

12- Which of the following shells do not exist ?
a)- $3d$ *b*)- $2d$ *c*)- $3p$ *d*)- $2s$

13- In Drude` equation, the drag force is given by .....
a)- p/τ *b*)- τ/p *c*)- $p\,\tau$ *d*)- $(p\,\tau)^{-1}$

14- In terms of the atomic radius (R), the length of the *fcc* cube (a) equals
a)- $a = 4R/\sqrt{2}$ *b*)- $a = 4R/\sqrt{3}$ *c*)- $a = 4R/\sqrt{4}$ *d*)- $a = R/4\sqrt{2}$

15- In terms of the atomic radius (R), the length of the *bcc* unit cell (a) equals
a)- $a = 4R/\sqrt{3}$ *b*)- $a = R/4\sqrt{3}$ *c*)- $a = R\sqrt{3}$ *d*)- $a = 2R\sqrt{3}$

16- Which of the following shells can be filled by 10 electrons ?
a)- $5s$ *b*)- $4p$ *c*)- $3p$ *d*)- $3d$

17- Which of the following shells can have 7 orbitals ?
a)- $4\,p$ *b*)- $3s$ *c*)- $3d$ *d*)- $4f$

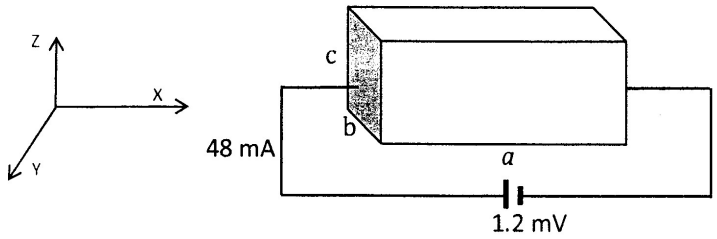
18- At temperature (T), the ratio of thermal conductivity (K) to the electrical conductivity (σ) of a metal, known as Lorentz number (L), is given by .....
a)- $L = K.T/\sigma$ *b*)- $L = \sigma.T/K$ *c*)- $L = K/\sigma.T$ *d*)- $L = K/\sigma$

19- According to the dispersion relation in one-dimensional lattice, "A system with periodicity (a) in real space has a periodicity in reciprocal space given by.....
a)- $k = 2a/\pi$ *b*)- $k = \pi/2a$ *c*)- $k = 2\pi/a$ *d*)- $k = 3a/2\pi$

20- A magnetic susceptibility $\chi = 0$ of any material means it is .....
a)- paramagnetic *b*)- diamagnetic *c*)- non-magnetic *d*)- ferromagnetic

Second Question :- ..... **[10 Degrees]**

An electric current 48 mA is passig through monovalent metal (a = 10 cm, b = 2 cm, c = 3 cm) when connected to an applied voltage 1.2 mV, as shown below. If you know that the metal density = 8.83 g/cm^3, the atomic weight = 58.69 , the electronic charge (e) = 1.6 x 10^{-19} C, and Avogadro`s number $N_A = 6.02x\ 10^{23}\ atom/mole$, calculate :-



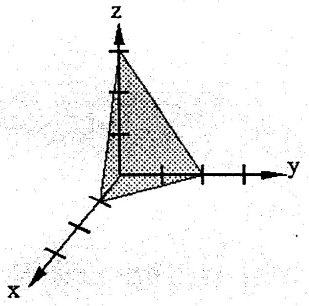
1-	The electric field (E_x) inside the metal = ... V/cm .....
2-	The current density (J_x) inside the metal = ... A/cm^2 .....
3-	The electrical conductivity (σ) of the metal = ...(ohm. cm)$^{-1}$ .....
4-	The electrical resistivity (ρ) of the metal = ...ohm. cm .....
5-	The number of atoms (n_a) per unit cube = ... atoms/cm^3 .....
6-	The number of free electrons (n) per unit cube = ... electron/cm^3 .....
7-	Hall coefficient (R_H) of the metal piece = ...
8-	Apply magnetic field (B_z = 2 Tesla), the built-in electric field E_y = ...
9-	The built-in voltage in y-direction V_y = ...
10-	The electric force (F_y) acting on one electron in y-direction = ...

Third Question:- .....

a)- In Drude` theory, three assumptions have been made for the ..... **[6 Degrees]**
free electrons motion inside the metals. These assumptions are ;

1-	.....
2-	.....
3-	.....

b)- Write down the Millar indices for the plane shown in the figure below, ... **[4 Degrees]**



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Fourth Question:- ..... **[10 Degrees]**

Sodium (Na^{11}) metal crystallizes in the form of body centered cubic structure. The cube edge equals 4.3 Å. The density of sodium metal equals 9.6 g/cm^3, its atomic mass = 23, and N_A =6.02X10^{23} atoms /mol.

1-	The four quantum numbers of the 11th electron are .....
2-	The electronic configuration of the sodium atom is .....
3-	The total spin quantum number of a neutral sodium atom is .....
4-	The volume (in cm^3) of one unit cell equals .....
5-	Number of lattice points related to one unit cell is .....
6-	Number of the nearest neighbors (*NN*) in the above crystalline lattice is .....
7-	The number of sodium atoms per one cm^3 equals .....
8-	The number of sodium atoms per one gram equals .....
9-	The number of unit cells per one cm^3 equals.....
10-	The radius of one sodium atom is .....

إنتهت الأسئلة مع تمنياتي بالتوفيق والنجاح

Assiut University Faculty of Science Department of Physics		Date: January 12th 2026. Duration: 3 hr. Course: Statistical Mechanics 313P

Question 1: Choose the correct answer (15 marks)

1.	Two events are mutually exclusive if they: a- Occur together b- Don't overlap c- Both are correct
2.	In a microscopic state, particles are partially specified by their: a- Pressure b- Temperature c- Momentum
3.	The area under curve in phase space represents: a- Probability b- Macrostate c- Probability density
4.	The "Probability from an Ensemble" method uses measurements on: a- Identical systems b- Different systems c- Similar systems
5.	The Doppler effect in gases causes a shift in radiation's ..... a- Velocity b- Intensity c- Wavelength
6.	The "Postulate of Equal A Priori Probabilities" assumes all microstates are: a- Equal likely b- Dependent c- Form an ensemble
7.	Striling approximation is written as: a- $\ln n! \approx N \ln N! - N$ b- $n! \approx \sqrt{2\pi N}(\frac{N}{e})^N$ c- Both are correct
8.	To find the number of molecules in a specific energy range, we integrate over a ..... a- Square box b- Spherical shell c- Linear path
9.	Root mean square velocity ($\sqrt{\langle u^2 \rangle}$) in Maxwell's distribution is: a- $\sqrt{\frac{2kT}{m}}$ b- $\sqrt{\frac{8kT}{\pi m}}$ c- $\sqrt{\frac{3kT}{m}}$
10.	The "Ergodic Hypothesis" assumes that the ensemble average is identical to the: a- Spatial average b- Time average c- Microstates sum
11.	In the Random Walk problem, the probability distribution converges to a normal distribution after calculating the: a- Total steps b- Mean square displacement c- Average and variance
12.	The frequency of an event is ..... when compared the probability. a- Future expectation b- Past record c- Irrelevant
13.	In the limit where N is very large, the Binomial distribution becomes a normal distribution. a- True b- False
14.	Maxwell distribution of energies represents a normal distribution. a- True b- False
15.	The main difference between Maxwell's and Fermi-Dirac distributions is the application of Pauli exclusion principle. a- True b- False

Rest of questions is in the back

Question 2: (17 marks)

Part i: Explain an experiment (with illustrate drawings) that proves the Maxwell Boltzmann distribution for molecular velocities. (4 marks)

Part ii: Describe the chemical potential and its role in the grand canonical ensemble and quantum statics. (4 marks)

Part iii: Find the total number of macro- and microstates of a system of 4 distinguishable particles distributed between 3 energy levels with $g_1 = 2$ *and* $g_2 = 4$. Given that the particles occupancy in a single state can't exceed 2, and the ground state can't be empty.
Compare your result in case of indistinguishable particles. (9 marks)

Question 3: (12 marks)

Part i: In terms of the partition function Z find the expressions of the following: (6 marks)

i. Total energy of the microcanonical ensemble.
ii. Heat capacity of a system at constant volume.
iii. Enthalpy H.

Part ii: Prove that the equilibrium condition in microcanonical ensemble depends on the total number of microstates. (6 marks)

Question 4: Calculate the number of microstates Ω for a single electron of mass m confined to a one-dimensional box of length L (the volume V). The particle has a total energy E within a small range δE. (6 marks)

$$m = 9.1 \times 10^{-31} kg, E = 2.3\ eV, \delta E = 0.2\ meV,$$
$$h = 6.625 \times 10^{-34} J.s \text{ and } L = 3\text{Å}.$$

End of questions

Good luck

Physics Department
Faculty of Science
Assiut University
1st Semester - 2025/2026
3rd Year
Final-term Exam

Physics and Electronics Program
Course Code: EC 325
Microprocessors
(معالجات دقيقة)
Date: January 22nd, 2026
Time: 9:00 am - 12:00 pm (3 hours)

Important Notes: Marks: 50, Number of Pages: 3, Number of Questions: 4

Answer All the Following Questions:

Question 1 *16 Marks*

i) Write the assembly code that: *(6 Marks)*

- initializes AL, BL, CL, and DL as follows: AL = 2F H, BL = 10 H, CL = 0D H, DL = 34 H
- performs the following logical expression:

$$x = (A \text{ AND } \overline{B}) \text{ XOR } (\overline{C} \text{ OR } D)$$

where A = AL, B = BL, C = CL, and D = DL (Note: $\overline{\square}$ = 1's complement of $\square$)

- stores the result x in AL

then show the contents of AL after the execution of the assembly code. *(1 Mark)*

ii) Show the contents of BX and the flag bits (CF, ZF, SF, OF, PF, and AF) after the execution of the following assembly lines: *(5 Marks)*

```
STC
MOV BL,5EH
ADC BL,97H
MOV BH,0C2H
SUB BH,48H
```

iii) Suppose that AL = 00101010 B. Using only logical instructions, write the assembly lines to preform the following operations, and then show the contents of AL: *(4 Marks)*

a) Multiply AL by 4
b) Divide AL by 8
c) Clear the bits No. 1, 3, and 5 in AL
d) Toggle the bits No. 0, 4, and 7 in AL

Question 2 *14 Marks*

i) Consider the following assembly lines, the shown part of memory, and the values of some registers:

```
MOV AX,4E69H
MOV CX,AX
MOV [BX+SI-12H],CX
MOV [DI],DX
```

5B659 H	....
5B658 H	....
5B657 H	2D H
5B656 H	87 H
5B655 H	....
5B654 H	....

BX = 2E46 H, DX = 92AC H, SI = 5820 H, DI = 8658 H, and DS = 5300 H.