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Mansoura University
Faculty of Science
Zoology Department
Subject: Zoology
Course :Cytogenetics(Z-221)

2nd level- Biophysics
1st term- Academic year:2015-2016
Date: 27/12/2015
Time: 2 hours
Full Mark: 60

Answer the following questions:-

Question 1 **(20 Marks)**

A- Define the following terms: Cytosol - Osmosis - Exocytosis - Cristae - Centromere

B-Complete the following sentences:

1-……means possession of more than two sets of homologous chromosomes.
2- Binary fission is a type of cell division that occurs in ……..
3- …… are organelles that function in energy production.
4- …..…… is the fluid portion of the nucleus in which……..is suspended.
5- …….. is a genetic disorder resulted from a deletion of a chromosome segment.
6- In mitosis division the stage by which the cell end up with 2daughter cells, is called……
7- Ribosome are of two types; …… and ……. Ribosomes.
8-…….. is a sexual reproduction occurs in germ cells.
9- After the degradation of harmful materials by the lysosome. Lysosome becomes ……. in the cell.
10-When the cells of an individual have three copies of chromosome 21, that condition is called……

Question2: Answer only two of the following: **(25 Marks)**

1- Give full account on the structure of the plasma membrane and illustrate by a labeled diagram.
2- Describe the structure and function of Golgi apparatus and illustrate by a labeled diagram.
3- Write on the different stages of the cell cycle and illustrate by a labeled diagram.

Question 3: **(15 Marks)**

Identify each statement as true (√) or false(X). Correct the false statements

1- When the cells of the new individual end up with Tetraploid (4N), this type of chromosomal abnormality is called polyploidy.
2- Nondisjunction can be caused by failure of chromosomes to separate during meiosis.
3- Genetic disorders can be caused by change in chromosome structure only.
4- Translocation is the movement of chromosome segment to a nonhomologus chromosome.
5-Large sized solid particles are taken inside the cells by a transport called endocytosis.
6- Sodium-potassium pump is a kind of transport that needs energy to move ions down a concentration gradient.
7- The fusion of gametes leads to the production of zygote with diploid(2N).
8- Nucleoid is the nuclear material with a nuclear membrane.
9- Individuals affected with Down syndrome have a chromosome number of 45.
10- Rough endoplasmic reticulum (RER) functions in the detoxification of toxic materials.

Best of luck

Prof.Dr. Nariman K. Badr El-Din

Mansoura University | **First term Exam, 3/1/2016**

Faculty of Science | **2nd level**

Physics Department | **Time allowed: 2 hours**

Full mark: 80 marks

Subject : physics | **Course : 221ف Physical optics**

Answer the following questions:

1- a) Give the optical arrangement to get Fraunhofer diffraction pattern using a rectangular single slit. Discuss this diffraction pattern. Drive the formula of intensity distribution of the resultant pattern.

(19 marks)

b) A grating with 6000 lines/cm is illuminated with monochromatic light at normal incident, the second order spectral line is observed to be deviated through 30^{o}. Calculate the wavelength of the spectral line.

(8 marks)

2- a) Give a brief account, with an explanatory diagram of the optical arrangement of Fabry-Perot system of multiple- beams interference. Drive an expression for the intensity distribution in transmission for this system when the two coated plate are of same transmission coefficient T and of same reflectivity R. Sketch schematic diagram for the intensity distribution.

(20 marks)

b) Drive Malus law of the intensity of polarized light transmitted through analyzer.

(7marks)

3- a) Demonstrate an explanatory diagram of the optical arrangement of Young's double slits experiment. Drive the necessary formulae for the brightness and darkness conditions.

(10marks)

b) Give an experiment to determine the thickness of a thin sheet of transparent material using Fresnel's biprism. Drive the necessary formula.

(8 marks)

c) A water film ($\mu = 1.33$) in air is 3000 A^{o} thick if it is illuminated with white light at normal incidence. What color will appears to be in reflected light?

(8 marks)

Good Luck

Prof. Dr. Taha Sokkar

Mansoura University Faculty of Science Physics Department	Vibrations and waves Level (2) code F211 Physics and Biophysics	Jan 2016 Time 2 hours

Section 1: Physics (Answer 3 questions only)

1- Find reflectance coefficient of wave in two connected wires with different density of unit length
2- Prove that the velocity of wave in gas makes an adiabatic change.
3- Find the condition to obtain a circle as a result of the superposition of to normal waves.
4- A) Prove that the amplitude of damping oscillator depends on time.

4- b) Prove that the total energy of simple harmonic motion is constant.

Section 2: Biophysics (Answer 3 questions only)

1- a) Find the wavelength and the velocity of two dimensions wave given by $\phi = 10 \sin(2x-2y-3t)$
b) A spring is hanged vertically from its upper end. Its lower end is connected by a mass of 9 Kg. Then it is pulled down a distance of 2 cm from its steady state position. If the spring constant = 1000 N/m , study its motion.
2- a) Prove that the total energy of light damped simple harmonic motion decreases exponentially.
b) Define the following: i) The periodic time ii) the frequency iii) the wave number iv) the wavelength v) the amplitude of the wave.
3- a) Study the coupled oscillations in case of mono atoms system.
b) Study the energy of free simple harmonic oscillation in an electric system.
4- a) Study the superposition of two perpendicular vibrations having the same frequency but differ in the amplitude and phase.
b) Study the oscillation of stationary wave.

Mansoura University
Faculty of Science
Chemistry Department
Course: CHEM 235

First Term Exam
Level Two: CHEM 235
Time Allowed: 2 Hours
Full Mark: 60 Marks
Date: 10 January, 2016

Answer the following questions:

Question (1): (15 Marks)

(A) Complete the following reactions by the major product(s):

(a) $CH_3-\overset{\overset{O}{\|}}{C}-CH_3 + 3\,I_2 \xrightarrow{\text{aq. NaOH}}$ ---------- + ----------

(b) 2  + aq. NaOH ⟶ ---------- + ----------

(c) $CH_3-\overset{\overset{CH_3}{|}}{CH}-CH_2-CH_3 + Cl_2 \xrightarrow{\text{Light}}$ ----------

(d) $CH_3-CH_2-CHO + H_2NNH-\overset{\overset{O}{\|}}{C}-NH_2 \longrightarrow$ ----------

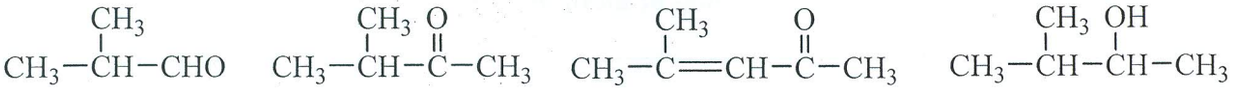
(e) $CH_3-\overset{\overset{CH_3}{|}}{C}=CH_2 \xrightarrow{HBr\,/\,H_2O_2}$ ----------

(d) $CH_3-C\equiv CH \xrightarrow{NaNH_2}$ ---------- $\xrightarrow{CH_3CH_2I}$ ----------

(B)An alkene with the formula C_8H_{16} reacts with ozone (O_3/Zn-H_2O) to provide acetone and pentanal. What is the structure of this alkene?

Question (2):

For compounds from (1) to (4), answer the questions (a) to (g): (15 Marks)



Compound (1) **Compound (2)** **Compound (3)** **Compound (4)**

(a) Give the IUPAC names for compounds (1), (2) and (3)?
(b) How can you convert compound (1) into compound (2)?
(c) Give the product when compound (1) is oxidized by potassium dichromate ($K_2Cr_2O_7$).
(d) Suggest a suitable method to prepare compound (3).
(e) How can convert compound (2) into compound (4).
(f) Action of phosphorus trichloride (PCl_3) on compound (4).
(g) Reduction of compound (1) with Zn-Hg in the presence of HCl.

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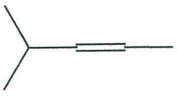
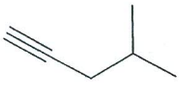
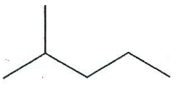
Question (3): **(15 Marks)**

(A) Choose the correct answer:

(1) Which from the following chemical structures has the IUPAC name: 4-Methyl-2-pentyne

(a)  (b)  (c)  (d) 

(2) The IUPAC name of the alcohol $CH_3CH(CH_3)CH_2CH(OH)CH_2CH_3$ is:
(a) 2-Methyl-4-hexanol (b) 2-Methyl-4-hexanone
(c) 5-Methyl-3-hexanol (d) 5-Methyl-3-hexanone

(3) Hydration of CH_3-C≡CH with water and $H_2SO_4/HgSO_4$ produces:
(a) CH_3CH_2CHO (b) CH_3COCH_3 (c) $CH_3CH_2CH_3$ (d) $CH_3CH=CH_2$

(4) Addition of two moles of HCl to 1-butyne produces?
(a) 1,1-dichlorobutane (b) 1,2-dichlorobutane
(c) 2,2-dichlorobutane (d) 2,3-dichlorobutane

(5) Compounds of the type R-CH_2-OH are refereed to as ..... alcohols.
(a) quaternary (b) tertiary (c) secondary (d) primary

(6) The major product that produced from the action of alc. KOH on $CH_3CH(Cl)CH_2CH_3$ is:
(a) $CH_2=CHCH_2CH_3$ (b) $CH_3CH=CHCH_3$ (c) $CH_3CH(OH)CH_2CH_3$

(B) Suggest a suitable method to differentiate between 2-butanol and 3-pentanol.

Qustion (4): **By equations only, Expalin the following reactions? (15 Marks)**

(1) Reaction of benzaldehyde with acetic anhydride in presence of CH_3COONa.
(2) Conversion of 2-butene into 2-butyne
(3) Heating of 2-methyl-2-butene with basic $KMNO_4$ solution.
(4) Kolbe electrolysis $KOOCCH_2CH_2COOK$.
(5) Reaction of acetaldehyde with two moles of methanol to form Acetal.

GOOD LUCK

Prof. Dr. Ahmed Fadda, Prof. Dr. Margret Mansour, Prof. Dr. Ehab Abdel-latif
Dr. Manal El-fidawy, Dr. Ghada Emad and Dr. Ibrahim Youssef

Mansoura University Faculty of Science PHYSICS DEPARTMENT Final Exam – 1st Term (13 Jan. 2016)	2015-2016	Second Level Students (BioPhysics program) Course: Modern Physics (Phy220) Time allowed: 2 hours

Full Mark: 80 (Every question: 20 Mark)

Answer the following questions

Q1: Choose the best answer:

1. Electromagnetic radiation can be treated by using particle model that was assumed firstly by

a) Schrödinger b) Einstein c) Planck d) Michelson

2. Michelson-Morley experiment approved ..... results for the hypothesis of the ether existence

a) sure b) negative c) positive d) none

3. Taking the limit of Lorentz transformation as ..... gives Galilean transformation.

a) velocity $v \to C$ b) velocity $v \to 1$ c) velocity $v \to \infty$ d) velocity $v \to 0$

4. A rectangle (length 30 cm, width 18 cm) in a craft viewed at the earth as a square, so the craft's speed is

a) $v = 0.600C$ b) $v = 0.824C$ c) $v = 0.800C$ d) none

5. At what speed will the electron mass become 2.5 times of its rest mass?

a) $0.845C$ b) $0.917C$ c) $0.987C$ d) $0.789C$

6. A particle has a kinetic energy equal to half of its rest-mass energy $(K = 0.5m_0C^2)$, so its momentum equal

a) $p = 1.118m_0C$ b) $p = 0.18m_0C$ c) $p = 0.5m_0C$ d) none

7. The quantum mechanics results tend to the corresponding classical limits as quantum number .....

a) $n \to 0$ b) $n \to \infty$ c) $n \to 1$ d) none

8. Light of $\lambda = 585nm$ incident on **K**-surface, and the stopping potential is 0.414 volts, what is threshold frequency?

a) $\nu_0 = 10^{12} Hz$ b) $\nu_0 = 10^{13} Hz$ c) $\nu_0 = 10^{14} Hz$ d) none

9. The minimum wavelength that can be obtained from an X-ray tube operated at 7500 volts, is

a) $\lambda_{min} = 165.3A^\circ$ b) $\lambda_{min} = 16.5nm$ c) $\lambda_{min} = 20.25nm$ d) **a** or **b**

10. The wavelength difference $\Delta\lambda$ in Compton scattering for scattering angle 54° is

a) $1A^\circ$ b) $0.1A^\circ$ c) $0.01A^\circ$ d) $0.001A^\circ$

Q2:

A) Write de Broglie hypothesis for the wave-particle duality, and calculate the de Broglie wavelength for a particle of mass $5 \times 10^{-25} g$ and speed 7500 *m/s*.

B) Two rockets are approaching to each other, each with velocity $0.9C$ relative to an observer on the earth. ***i)*** Calculate the relative speed of each rocket with respect to the other. ***ii)*** Compute the increase ratio of their masses.

Q3: A) Write Einstein's postulates of special theory of relativity and Explain briefly why the need of this modern theory.

B) Show in details how Einstein succeeded to explain the photoelectric phenomenon.

Q4: A) In light of wave-particle duality principle, explain the wave nature of particles using the diffraction of electrons experiment.

B) Write the basic three postulates of quantum mechanics, and derive the energy operator.

With my best regards,,, Prof. Dr. M. Sallah

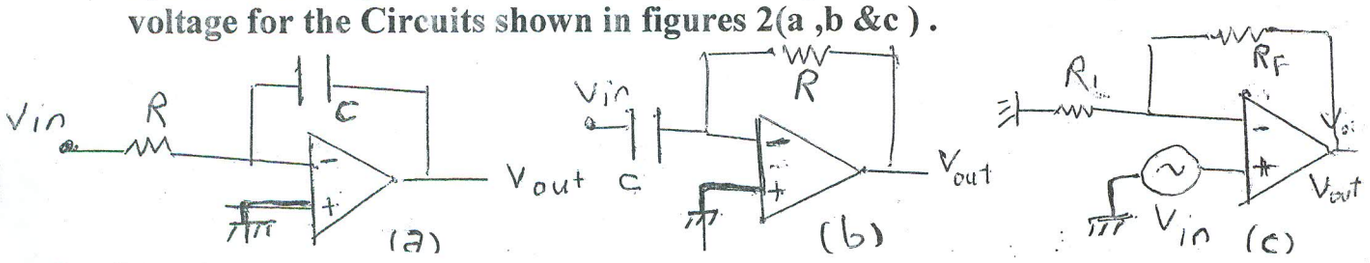
$C = 3 \times 10^8 m/s, h = 6.625 \times 10^{-34} J.s, e = 1.6 \times 10^{-19} c, m_{e_0} = 9.1 \times 10^{-31} kg$

Mansoura university **Faculty of Science** **Physics Department**		**first Term** **Second Year: Biophysics** **Date :Jan. 2016** **Allowed time: 2 hours**
Electricity in Bio-systems Exam. Code:210		**Full Mark: 80 Marks**

Answer The following Questions:

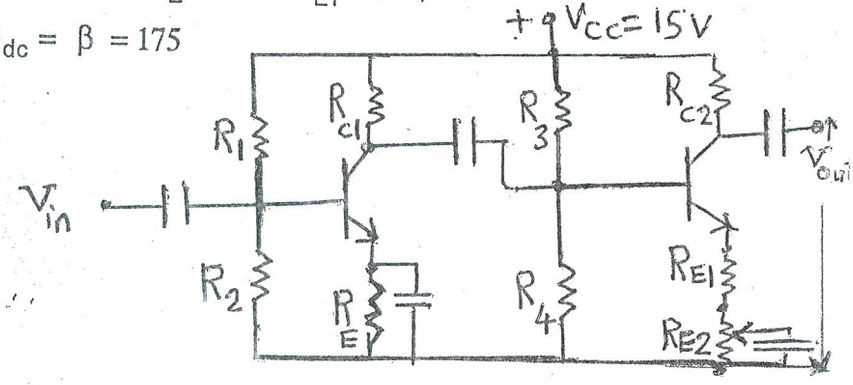
1] Write briefly on
Electrical conduction properties of a neuron - Resting potential – Action potential - electrical equivalent circuit of a nerve fiber.

2] Derive an expression for the output voltage in terms of the input voltage for the Circuits shown in figures 2(a ,b &c) .



3- a) Derive an expression for the voltage gain of the inverting operational amplifier.

b) Determine the overall minimum and maximum gain of the two stage amplifier circuit shown in figure (3), where $R_1 = R_3 = 33$ K, $R_2 = R_4 = 8.2$ K , $R_{C1} = R_{C2} = 3.3$ K , $R_E = 1$K , $R_{E1} = 60$, $R_{E2} = 0$ To 940 ohm & $\beta_{dc} = \beta = 175$



4- a)Derive the condition required for stable biasing of the transistor circuit shown in figure (4-a).

b) Derive an expression for the output voltage of the operational amplifier circuit in figure (4-b) ,then determine the value of R which make the output voltage equal the average value of the input voltages .

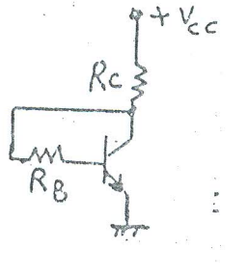


figure (4-a)

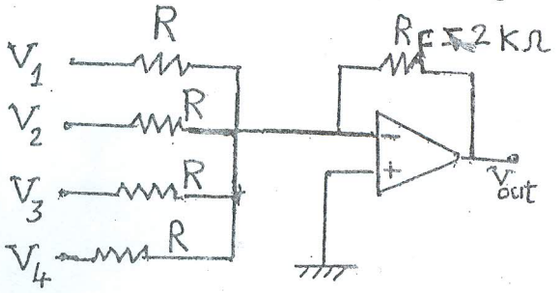


figure (4-b)

Mansoura University
Faculty of Science
Physics Department

Elastic Physics (PHYS215)
Time: 2 hours
Physics+BioPhysics(2nd level)

Final Term Exam, (2015-2016) Marks: 80

Answer the following questions

Q1- a) Define: Shear stress, modulus of rigidity, Ductile and brittle fracture, Intergranular and transgranular fracture, Compressibility, Poisson's ratio.

Q1- b) What types of imperfections in solids and how do defects affect material properties, are defects undesirable or not?

Q1- c) A 30 cm long glass fiber of diameter 0.05 mm is broken when exposed to atmosphere for 6 hours. The breaking load is estimated to be 0.16 N. Given $Y = 7 \times 10^{10}$ N.m^{-2} and $\gamma = 0.6$ J.m^{-2}. Calculate the following: a) Fracture stress, b) Crack depth, c) Stress at the tip of the crack assuming tip radius to be 1.5 Å just prior to fracture.

Q2- a) Distinguish between Frenkel defect and Shottky defect?

Q2 - b) A sheet of copper 0.750 m long, 1.00 m high, and 0.500 cm thick is acted on by a tangential force of 50,000 N. The value of S for copper is 4.20×10^{10} N/m^2. Find (a) the shearing stress, (b) the shearing strain, and (c) the linear displacement Δx.

Q2- c) During the manufacturing process should avoid sharp corners, why?

Q3- a) ***Explain***;

i- Cracks with sharp tips propagate easier than cracks having blunt tips.

ii- Ductile-to- brittle transition temperature.

Q3 - b) Define: Fatigue, high cycle fatigue, fatigue limit, fatigue strength, and fatigue life.

Q3- c) Find the number of vacancy concentration in 1 cm^3 of Cu at 1000 °C.

Given; ρ=8.4 g/cm^3, A_{Cu}=63.5 g/mol., Q_v=0.9 eV/atom , N_A=6.02 x 10^{23} atoms/mol, K = 8.62 x 10^{-5} eV/atom.

Q4- a) Clarify; stages of fatigue failure, creep, stages of creep, mechanisms of creep

Q4- b) What are the factors that affect fatigue life and how to solve?

Q4- c) Discuss and draw the relation between *stress amplitude* and *number of cycles to failure* (S-N curves) for Fe and Al.

With my best wishes

Prof. Dr. Rizk Mostafa Ibrahim

Mansoura University Faculty of Science Physics Departement Subject: Introduction to Biophysics Course code: biophys221		First Term, Final Exam 2nd Students Time Allowed :2 h . Date :20/1/2016 Full Mark :80 Mark

Answer all the following questions

I-Write short notes about each of the followings:

a) Cobalt 60 and linear accelerator

c) Classification of light atom interaction

b) Ion distribution in cell membrane

e) Acoustic impedance

f) Transducer

g) Equivalent Circuit Model for the Plasma Membrane

h) Treatment planning software

d) Compton Effect

II-Choose the correct answer from the followings:

1) The process in which α and β rays pass close to atoms and knocks the electrons out is called:

a) Ionization

b) Ionisation

b) Decay

d) None of above

2)The sound that emanates from a piezoelectric transducer originates:

a) From a point on the active surface

b) From most of the active surface

c) From a small area in the center of the active surface

d) From the edges of the active surface

3) Period is determined by:

a) Sound source

b) Medium

c) Both

4) The time it takes a wave to vibrate a single cycle, or time from the start of a cycle to the start of the next cycle :

a) Period

b) Frequency

c) Wavelength

d) Speed

e) Power

5) Which of the following ions are involved in neuronal action potentials؟

a) Na^+

b) K^+

c) Cl^-

d) A and B only

e) A, B, and C

6) At what membrane voltage do neuronal voltage-gated Na^+ channels become activated`

a) −70 mV

b) −55 mV

c) 0 mV

d) +55 mV

7) At what membrane voltage do neuronal voltage-gated K+ channels become activated?

a) −70 mV

b) −55 mV

c) 0 mV

d) −90 mV

8) The hyperpolarization phase of the action potential:

a) Is due to the opening of voltage-gated Cl− channels

b) Is due to the prolonged opening of voltage-gated K+ channels

c) Is due to the closure of resting Na+ channels

d) None of the above

9) What is a major health concern wth MRI?

a) Reaction to applied drug

b) extrerme cold؟

c) Radiation dose

d) localized burns due to metallic implants?

10) Uses high doses of radiation to kill cancer cells and shrink tumors, delivered precisely to avoid damaging healthy brain tissue.

a) Radiation therapy

b) Ionizing radiation

c) X-ray

d) Radiosurgery

11) Which of the following is NOT true about the neuronal action potential؟

a) Action potentials are all-or-nothing .

b) Action potentials travel along axons in a non-decremental fashion .

c) Repolarization and hyperpolarization are due to the activity of K+ channels .

d) All of the above are true about action potentials.

12) Which of the following is NOT a source of background radiation?

a) Radiation from Naturally occurring unstable isotopes.

b) Radiation from a Source being measured.

c) Radiation from Space.

d) Radiation from Human Activity.

13) Which of the following types of radiation can enter living cells and cause ionization, thus damaging or destroying the cell?

a) Gamma. b) Alpha and Beta.

c) Beta and Gamma. d) Alpha, Beta and Gamma.

14) Where does radiation come from?

a) An electron b) An atom.

c) A stable nucleus d) An unstable nucleus which decays.

15) Which type of radiation would be stopped by a few millimetres of aluminium, but not by paper?

a) Gamma. b) Infra-red.

c) Alpha d) Beta.

III-Write the scientific expression:

a) The component of the ultrasound imaging equipment that is placed in direct contact with the patient's body( ).

b) Conversion of electrical energy to mechanical energy and vice versa ( ).

c) Nerves that communicate messages between the central nervous system and the rest of the body nerves that communicate messages between the central nervous system and the rest of the body( ).

d) Places radioactive material into tumor or surrounding tissue( ).

e) The action potential goes past -70 mV because the potassium channels stay open a bit too long( ).

f) A pair of reflecting surface of which one is a perfect reflector and the other is a partial reflector( ).

مع تمنياتي بالتوفيق

د/أمل الشهاوي
