

Mathematical Physics 1	Tanta University
First term exam 2021	Faculty of Science
Prof. Dr. Atef Elbendary	Physics Department
Time: 2 Uhr, Date: 15/3/2021	Level 2: Physics, Biophysics, Material Program Corse code: PH 2161

Q1: Choose the correct answer (50 degree)

صحيح

1- Solution of $y = x^2 + c$ is

(a) $Y' = 2x + c$

(b) $Y' = 2x + cx$

(c) $Y' = x^3/3 + c$

(d) $Y' = 2x$

2- Solution $Y = cx^2$ is

(a) $y' = 2y/x$

(b) $y' = 2xy$

(c) $y' = xy^2/2$

(d) $y' = 2x/y$

3- solution of $y^2 = e^{2x} + c$ is

(a) $y' = e^{2x}$

(b) $y y' = e^{2x}$

(c) $y' = 2e^x$

(d) $x y' = y$

4- solution of $y = c e^{kx}$ is

(a) $y' = kx$

(b) $y' = e^{kx}$

(c) $y' = ky$

(d) $y' = kxy$

صحيح

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5- solution of $y = a \sin 2x + b \cos 2x$ is

(a) $Y'' = 2x \sin 2x$

(b) $Y'' = 2x \cos 2x$

(c) $Y'' = \sin 2x + \cos 2x$

(d) $Y'' + 4y = 0$

6- solution of $y = a e^{2x} + b e^{-2x}$ is

(a) $y'' = e^{2x}$

(b) $y y'' = e^{2x}$

(c) $y'' = 2e^x$

(d) $y'' - 4y = 0$

7- solution of $y = x + a \sin 2x$ is

(a) $Y'' = 2x \sinh 2x$

(b) $Y'' = 2x \cos 2x$

(c) $Y'' + 4y = 4x$

(d) $Y'' = \sin 2x + \cos 2x$

8- Solution of $xy = \ln y + c$ is

(a) $Y' = e^x$

(b) $y' = y^2 / 1 - xy$

(c) $y' = e^x + y$

(d) $y' = 1 + xy$

9- Solution of $y' = 2xy$ is

(a) $xy = \ln y + c$

(b) $y = y^2/x$ (c) $\ln y = x^2 + c$

(d) $y = 1 + xy$

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10- solution of $y = a e^{2x}$ is

(a) $y'' = e^{2x}$

(b) $y'' = 4ae^{2x}$

(c) $y'' = 2e^x$

(d) $y'' - 4x = 0$

Q2: Solve the following, (50 degree)

1- $x^5 y' + y^5 = 0$

2- $X y' + y = x^4 y^3$

3- $X y' = (1 - 4x^2) \tan y$

4- $X y^2 - y' x^2 = 0$

5- $Y' + xy = xy^4$

With my best wishes, Prof. Dr. Atef Elbendary



COURSE TITLE:	Mathematical physics		COURSE CODE: PH 2262
DATE:	3 \1\2021	TERM: FINAL	TIME ALLOWED: 2HOURS
		TERM	TOTAL ASSESSMENT MARKS:100

Answer the following questions:

First question:- (25Marks)

(i) Find the value of x, y , in the following; $\Gamma(x+1) = 6, \beta(y,1) = 1$,

(ii) Prove that $\int_0^{\pi/2} \sin^7 x \cos^4 x dx \neq 2$, (15 Marks)

(iii) Find the temperature T by using Bessel Function if the gradient temperature given by the following equation,

$$x^2 (d^2T/dx^2) + x (dT/dx) + (T^2 - 1/4) x = 0, \quad (10 \text{ Marks})$$

Second question:- (25 Marks)

(i) By observe that $y = x$ is a solution, solve the following

$$y'' - [(x+2)/x]y' + [(x+2)/x^2]y = x e^x \quad (15 \text{ Marks})$$

(ii) Solve $y'' - y = e^{2x}$ (10 Marks)

Third question:- (30 Marks)

Solve (i) $y'' + 3y' + 2y = e^x$


(ii) $\Gamma(1/4) \Gamma(3/4) = ??$

(iii) $\beta(x,y)$ at $x=5, y=6$

Fourth question:- (20 marks)

The equation describes the current at electric circuit containing R, L, C is given by $L (d^2 I/d t^2) + R (d I/d t) + I/C = 0$, solve this equation to find the condition of oscillation and condition of damping system with no oscillation.

EXAMINERS	Prof. DR. Atef Elbendary
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	TANTA UNIVERSITY- Faculty of Science -Department of Physics			
	EXAM FOR LEVEL TWO STUDENTS OF BIO AND GEOPHYSICS			
COURSE TITLE	Electromagnetism 1		COURSE CODE: 2184	
DATE:	2020/2021	TERM: FIRST	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2HOURS

1- **First Question:** [25Marks]

The vertices of a triangle are located at $A(6, -1, 2)$, $B(-2, 3, -4)$, and $C(-3, 1, 5)$; Find:

- (a) R_{AB} ; (b) R_{AC} ; (c) The angle θ_{BAC} at vertex A;
 (d) The vector projection of R_{AB} on R_{AC} ; (e) $R_{AB} \times R_{AC}$;
 (f) The area of the triangle;
 (g) A unite vector perpendicular to the plan in which the triangle is located.

Second Question: [30Marks]

- 1- Transform to cylindrical coordinates $F = 10a_x - 8a_y + 6a_z$ at point $(10, -8, 6)$;
- 2- Give the Cartesian components of the vector $H = 20a_\rho - 10a_\phi + 3a_z$ at $P(x=5, y=2, z=-1)$.
- 3- Write down the equation of:
 - a) The vector form of electric force acts along the line joining the two charges Q_1 of position vector r_1 and Q_2 of position vector r_2 .
 - b) The electric field at a point $P(x, y, z)$ due to the two point charges Q_1 and Q_2 .
 - c) The electric field at a point $P(x, y, z)$ due to the n number of point charges (Q_1, Q_2, \dots, Q_n) .

Third Question: [20Marks]

Point charges of $50nC$ each are located at $A(1, 0, 0)$, $B(-1, 0, 0)$, $C(0, 1, 0)$, and $D(0, -1, 0)$ in free space. Find the total force on the charge at A.

Fourth Question: [25Marks]

- 1- State the following:
 - a) Faraday's experiments;
 - b) The concept of electric flux density.
 - c) Gauss's Law.
- 2- Find the electric field due to uniform line charge distribution.

EXAMINER	ASSOC. PROF. REDA EL-SHATER
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☺ BEST WISHES ☺

Course Title:	Crystallography And X-Ray		Course Code :PH2191
Date : 8March 2021	Term First	Total Assessment Marks :50	Time Allowed : 2Hours

(Answer the following questions)

The first question (12.5 Marks)

a-Define and illustrate by drawing each of the following :-

- 1-the crystal lattice
- 2-the unit cell
- 3-zones and zone axes
- 4-the axis of two fold rotation
- 5-the plane of symmetry.
- 6-the center of symmetry

The second question (12.5 Marks)

a-determine the indices of a face which lies in two zone $[1\ 1\ 1]$ and $[\bar{1}\ 0\ 1]$

b-explain by drawing the formation of

- 1-ionic crystals
- 2-valance crystals

The third question (12.5 Marks)

a- Show by drawing how the x-rays are produced by the gas-filled types and write four of its characteristics.

b-show how the two types of X-Ray spectra are produced

The fourth question (12.5 Marks)

a-Explain how the x-rays scattered from a series of atomic planes and drive the equation of Bragg's law

b-X-rays with wavelength $1.54\ \text{Å}$ are reflected from the (110)

plane of cubic crystal with unit cell $a=6\text{Å}$ calculate the Bragg angle θ for the order $n=1$



TANTA UNIVERSITY
FACULTY OF SCIENCE
DEPARTMENT OF PHYSICS

EXAMINATION FOR FRESHMEN (SECOND YEAR) STUDENTS OF PHYSICS, M.S. AND BIOPHYSICS

COURSE TITLE: **Vibration and Waves** موجات COURSE CODE:PH2121

DATE: 13/1/2021 TERM: FIRST TOTAL ASSESSMENT MARKS:100 TIME ALLOWED: 2 HOURS

Answer The Following Questions

First Question:

(25 mark)

- a) Verify that the solution $x = (A + Bt)e^{-\frac{rt}{2m}}$ satisfies the equation $m\ddot{x} + r\dot{x} + sx = 0$ when $\frac{r^2}{4m^2} = \frac{s}{m}$.
- b) Prove that the kinetic energy and potential energy of a particle executing SHM with amplitude, a , will be equal when its displacement equal $\frac{a}{\sqrt{2}}$.

Second Question:(25 mark)

- a) Derive the displacement, x , as a function of time, t , for a mass m oscillates under a restoring force, sx , and fractional force, $r\dot{x}$, and discuss the behavior of this displacement when the damping resistance term is less than stiffness term.
- b) If the equation of motion of a mechanical damped harmonic oscillator is given by $4\ddot{x} + 8\dot{x} + 200x = 0$. Find the damping frequency of the oscillation.


Third Question:(25 mark)

- a) The equation of motion of a forced oscillator is given by $m\ddot{x} + r\dot{x} + sx = F_0 e^{i\omega t}$. Find the steady state displacement and the velocity of the given oscillator.
- b) The maximum velocity for a particle in SHM is 0.16 m/s and maximum acceleration is 0.64 m/s^2 . Prove that the amplitude equal $4 \times 10^{-2} \text{ m}$.

Fourth Question:(25 mark)

- a) Define the logarithmic decrement. If the normal frequency of an oscillator is 50 cycle/sec while the damping frequency is 40 cycle/sec, find the logarithmic decrement of this oscillator.
- b) Find the period of oscillation, T , for a simple pendulum of mass, m , swinging at the end of a light rigid rod of length L ?

EXAMINERS	PROF.DR. G.A.GABALLA	

	Tanta University Faculty of Science Physics Department	
	Examination of Level 2 Physics and Material Science Programs	
	Course Title: Electromagnetic Theory I	Course Code: PH2151
	Date: 11-1-2021	1 st Semester

The first question (40 marks): -

Rewrite the following sentences , and complete them

1. The most common application of the cross product is.....
2. The electric field intensity between the parallel plates of an air capacitor equals
3. The potential isfield, where the electric field intensity isfield .
4. The Gauss's surface satisfies two conditions 1) 2).....
5. The physical interpretation of the divergence of the vector is described as.....
6. For a finite length of coaxial cable there is a field in.....
7. The maximum value of the rate change of the potential with distance is obtained when the direction of is opposite to the direction of
8. The energy expended in moving a point charge in an electrostatic field is between two points.
9. Any field satisfies that the closed line integral equals zero, is called..... Field.
10. The differential form of Gauss's law is written as

The second question (40 marks) :-

- a) Prove that $\text{div}D$ for a point charge equals zero, where D the electric flux density, except at $r=0$.
- b) A dipole has a moment $P= 6a_z$ nc.m.is located at the origin in free space, find the potential and the electric field intensity at the point ($r=4\text{m}$, $\theta=20^\circ$)

The Third question (30 marks):


- a) Use the cylindrical coordinate system to obtain the surface area and volume of cylinder with radius a and height h .
- b) Four equal point charges, each one equals 4nc are located in free space at the corners of a square of one meter for a side, find the energy stored in that system.

The forth question (40 marks):

- a) Given a $40 \mu\text{c}$ point charge located at the origin, find the electric flux ψ through the closed surface $\rho = 20 \text{ cm}$ and $-20 \leq z \leq 20 \text{ cm}$.
- b) A charge 40 nc is distributed uniformly on a ring with radius 2m , find the potential at the point 5m from the center of the ring and perpendicular to the plane of it.

ϵ_0 is the permittivity of free space = $(8.854) * 10^{-12} \text{ F/m}$

With my best wishes
استاذ المادة: أ.د/ سلوى سعد محمد

	Tanta University Faculty of Science Physics Department	
	Examination of Level 2 Physics and Material Science Programs	
	Course Title: Electromagnetic Theory I	Course Code: PH2151
	Date: 11-1-2021	1 st Semester

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Rewrite the following sentences , and complete them

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With my best wishes
استاذ المادة: أ.د/ سلوى سعد محمد

	المستوى الثاني	PH2222	جامعة طنطا كلية العلوم قسم الفيزياء
	شعبة الفيزياء شعبة الفيزياء الحيوية	Final Exam – First Semester	
	Date: 30/12/2020	Total Mark=100	
	إد/فاروق مصطفى المكاوي د/فاطمة الزهراء فخري فهمي	بصريات ضوئية	

Answer the following questions:

First question:

- a) Find the equation of motion of two wave trains with the same frequency. [15 marks]
- b) Draw the diagram of fresnels biprism. [10 marks]

Second question:

- a) Explain the formation of spectra by grating. [15 marks]
- b) Discuss Brewster's law. [10 marks]


Third question:

- a) Explain Young's double-slit experimental. [15 marks]
- b) Draw the diagram of a nicol prism. [10 marks]

Fourth question:

- a) Find the equation of sine wave. [15 marks]
- b) Discuss the law of Malus. [10 marks]

Good luck

	Tanta University Faculty of Science Physics Department	
	Examination of Level 2 Physics Programs	
	Course Title Analytical mechanics	Course Code: PH2242
	Date 31-12-2020	متطلب تخرج

Question 1 (30 points):

- a) Prove that Hamilton's function H is constant and equals to the total energy of the system.
- b) Find Lagrangian and Lagrange's equation of motion for the physical pendulum.

Question 2 (40 points):

- a) A Rigid body of arbitrary shape rotates freely under zero torque. By means of Euler's equations, show that both the magnitude of angular momentum and rotational kinetic energy are constant.
- b) Find the principal moments of inertia of the cube of mass m and side a about a set of principle axes at the center of mass of the cube

Question 3 (30 points):

- a) Find the center of mass of a uniform semicircular lamina of radius a .
- b) Consider a thin uniform rod of length a , swinging as a physical pendulum about one end. Obtain the period of oscillation, the radius of gyration about the center of mass k_{cm}^2 and the position of the center of oscillation.

لجنة الممتحنين

أ.د/ سلوي سعد أ.د/ على عبد السلام ابراهيم