المستوى: الأول المادة : تفاضل وتكامل كود المادة ر ١١٢	كلية العلوم – قسم الرياضيات	الزمن: ساعتين التاريخ : ١٤/٥/٢٠١٦ الدرجة الكلية: ٨٠ درجة

البرنامج: جميع برامج المستوى الأول

أجب عن أربعة أسئلة فقط مما يلى

السؤال الأول إجبارى للشعب الرياضية والفيزيائية:- (٢٠ درجة)

أ- أوجد مساحة المنطقة المحدودة بالمنحنيات $y = x + 2,\ y = x^2$. (٦ درجات)

ب- أوجد كلاً من التكاملات التالية: (٨ درجات)

$(i) \int_{-2}^{2} |x+1| dx$ $(ii) \int sin^2x\, cos^3x\, dx$

ج- حدد مناطق التزايد والتناقص والقيم العظمى والصغرى المحلية للدالة

$f(x) = \frac{1}{3}x^3 - x^2 - 3x + 3$. (٦ درجات)

السؤال الثانى:- (٢٠ درجة)

أ-أوجد $\frac{dy}{dx}$ لكل من الدوال التالية: (٨ درجات)

$(i) y = tan^{-1}(5x) + (tan5x)^{-1}$ $(ii)\ ysinx + x^3 = xe^x$

ب- أوجد كلاً من التكاملات التالية: (٨ درجات)

$(i) \int tan^{-1}x\, dx$ $(ii) \int \frac{1}{x(lnx)^2} dx$

ج- إدرس اتصال الدالة التالية عند $x = -3$، (٤ درجات)

$$f(x) = \begin{cases} \frac{x^2-9}{x+3} & ,x \neq -3 \\ 5 & ,x = -3 \end{cases}$$

السؤال الثالث:- (٢٠ درجة)

أ- أوجد $\frac{dy}{dx}$ لكل من الدوال التالية: (٦ درجات)

$(i)\ y = (x^2+1)^{cosx}$ $(ii)\ y = e^{sin3x}\sec(x^3+5)$

ب- أوجد كلاً من التكاملات التالية: (٦درجات)

$(i) \int (tan3x + sec3x)^2\, dx$ $(ii) \int \frac{1}{\sqrt{4-x^2}} dx$

ج- إدرس إمكانية وجود معكوس للدالة $f(x) = \frac{x-3}{x+2}$ حيث $f: \mathbb{R} - \{-2\} \to \mathbb{R} - \{1\}$، ثم أوجده إن وجد. (٨ درجات)

إقلب الصفحة

السؤال الرابع:- (٢٠ درجة)

أ- أوجد كلاً من التكاملات التالية: (٦ درجات)

$$(i)\int_0^1 x^2\,e^x dx \quad (ii)\int_0^{10} \frac{x}{\sqrt{x^2+4}}dx$$

ب- أوجد $\frac{dy}{dx}$ لكل من الدوال التالية: (٦ درجات)

$$(i)\ y = 2^{\sin^{-1}x} \qquad (ii)\ y = \ln(\sec x)$$

ج- إذا كانت $f(x) = \sqrt{2-x}$، $g(x) = x^2 + 2x$ أوجد مجال تعريف كل منهما ثم أوجد $f\circ g$، $g\circ f$. (٨ درجات)

السؤال الخامس:- (٢٠ درجة)

أ- أوجد كلاً من النهايات التالية: (٨ درجات)

$$(i)\ \lim_{x\to 0^+} x\ln x \qquad (ii)\ \lim_{x\to 81}\frac{\sqrt[4]{x}-3}{\sqrt{x}-9}$$

ب- أوجد المشتقة الثانية للدالة $f(x) = x^2 + \frac{1}{x^2}$ عندما $x = 1$. (٦درجات)

ج- أوجد كل من التكاملات التالية: (٦ درجات)

$$(i)\int \frac{1}{\sqrt{x}(5+\sqrt{x})^2}dx \qquad (ii)\int sec^2x\,tan^3x\,dx$$

مع أطيب التمنيات

أسرة قسم الرياضيات

Mansoura University
Faculty of Science
Chemistry Department
Subject: Physical Chem.
Course: Chem. 141

Final exam
First level student
Time Allowed: 2 hours
Full Mark: 60 Marks
Date:May, 2016

(Atomic weight of some elements C=12, O=16, N=14, H=1, Cu=64 and Zn=65)

Answer the following questions

1- [20marks]

a. Complete:

1) For a reversible reaction, the calculated Q (quotient)value is such that $Q < K_c$, this means that the reaction shifts to ..... .

2) Raoult's law states that :" The partial pressure of the solvent above the solution is proportional to its ....."

3) If Ka $=10^{-5}$ for acetic acid, the dissociation constant for the conjugate base is equal to.....

4) According to the kinetic theory of gases:"The kinetic energy of molecules depends on the ....."

5) A chemical reaction that absorbs heat from the surroundings is said to be _____ and has a _____ΔH at constant pressure.

b. Give a brief account on Raoul's Law.

2- a. Assign true or false for the following and comment on the answer: [20marks]

1. Osmosis is a result of passage of solute or solvent molecules through semipermeable membrane ( ).
2. The % ionization for weak acid = (acid concentration at initial) / (acid concentration at equilibrium) x 100 ( ).
3. the compressibility factor Z for an ideal gas is such that Z =0 ( ).
4. For the reaction at equilibrium: $3Fe_{(s)} + 4\,H_2O_{(g)} \rightleftharpoons Fe_3O_{4(s)} + 4\,H_{2(g)}$ $K_p > K_c$ ( ).
5. The value of ΔH° for the reaction $CH_4\,(g) + 3Cl_2\,(g) \neg CHCl_3\,(l) + 3HCl\,(g)$ is -336.0 kJ. The heat (kJ) released to the surroundings when 23.0 g of HCl is formed is 71.6 KJ.

b. Deduce the relation between K_P and K_C.

3. **[20 Marks]**

a. Explain what colligative properties term means. .

b. Calculate the $[H^+]$ for the following solutions:

i. 0.1 M CH_3COOH (Ka $=1.82 \times 10^{-5}$).

ii. 0.1 M CH_3COONa.

iii. Mixture from i and ii solutions

Mansoura University Faculty of Science **PHYSICS DEPARTMENT** **Final Exam – 2nd Term** (4 June 2016)	**2015 – 2016**	**First Year Students** **(Phys. + Biophys. + Math. + Stat.)** **Course: Phy 104 (Electromagnetic Theory)** **Time allowed: 2 hours**

Answer the following questions

(Q1: 15 Mark, Q2: 15 Mark, Q3: 10 Mark, Q4: 20 Mark) **Full Mark: 60**

Q1:

A) A charged wire of length L lies on z-axis, and its linear charge density varies as $\lambda = \lambda_0 z$ '. Find the electrostatic field strength $\underline{E}(\underline{r})$ at a point away from the mid of the wire a distance d.

B) Derive the 4th Maxwell's equations in case of time-dependent electromagnetics.

Q2:

A) Solve Laplace's equation to find the electrostatic potential inside an equi-potential $\left[\Phi \equiv \Phi(\rho,\varphi)\right]$ half-cylindrical surface connected with battery of voltage V_0 and the lower plane surface connected to the ground.

B) Define each of the following:

Polarization vector – Faraday's law – Electric dipole moment – Element of Current – Continuity equation.

Q3:

A) Find the magnetostatic field intensity on the axis of a coil of ***N*** turns, and radius ***R***.

B) Prove that the net bound charge of a dielectric material vanishes.

Q4: Choose the BEST answer:

1. At point $\left(2,\frac{\pi}{4},-3\right)$ in cylindrical coordinates, which of the following is correct

a) $x=\sqrt{2}$ b) $\theta = 0.813\pi$ c) $r=\sqrt{13}$ d) all

2. A field $\underline{F}$ is said to be conservative if

a) $\underline{\nabla}\cdot\underline{F}=0$ b) $\underline{\nabla}\times\underline{F}=0$ c) $\int_C \underline{F}\cdot d\underline{\ell}=\rho$ d) $\underline{\nabla}(\underline{F})=0$

3. The continuity equation for non-steady current has the form:

a) $\underline{\nabla}\cdot\underline{J}=0$ b) $\underline{\nabla}\times\underline{J}=0$ c) $\underline{\nabla}\cdot\underline{J}+\frac{\partial\rho}{\partial t}=0$ d) $\underline{\nabla}\times\underline{J}+\frac{\partial\rho}{\partial t}=0$

4. For isotropic, linear and homogeneous dielectric material, the relation between the polarization vector $\underline{P}(\underline{r})$ and electrostatic filed intensity $\underline{E}(\underline{r})$ is given by

a) $\underline{P}(\underline{r})=\chi\underline{E}(\underline{r})$ b) $\underline{P}(\underline{r})=\varepsilon\chi\underline{E}(\underline{r})$ c) $\underline{P}(\underline{r})=\varepsilon_0\chi\underline{E}(\underline{r})$ d) none

5. For any vector field $\boldsymbol{A}$, which of the following is correct

a) $\underline{\nabla}\times\underline{\nabla}\times\underline{A}=0$ b) $\underline{\nabla}\cdot\underline{\nabla}\times\underline{A}=0$ c) $\underline{\nabla}\cdot\underline{\nabla}\,A_x=0$ d) all

6. The total flux of a field $\underline{A}$ out of a surface S surrounds a volume V, is defined by the integral

a) $\psi=\int_V \underline{A}\,dv$ b) $\psi=\int_S \underline{A}\cdot\hat{\underline{n}}\,ds$ c) **a** and **b** d) none

7. Laplace's equation in electrostatics can be written for the electrostatic potential Φ as

a) $\underline{\nabla}\Phi=0$ b) $\nabla^2\Phi=0$ c) $\nabla^3\Phi=0$ d) none

8. Ampere's circuital law takes the form

a) $\int_C \underline{B}\cdot d\underline{\ell}=I_{enc.}$ b) $\underline{\nabla}\cdot\underline{H}(\underline{r})=J(\underline{r})$ c) $\int_C \underline{H}\cdot d\underline{\ell}=I_{enc.}$ d) **b** and **c**

9. Gauss' law in electrostatics corresponds to ..... Maxwell's equation **(write its formula after the choice)**

a) 1st b) 2nd c) 3rd d) 4th

10. The fact that "*there is no single magnetic pole in nature*" can be expressed mathematically as

a) $\underline{\nabla}\times\underline{B}=0$ b) $\underline{\nabla}\times\underline{H}=0$ c) $\underline{\nabla}\times\underline{A}=0$ d) $\underline{\nabla}\cdot\underline{H}=0$

With my best wishes,,,,, *Prof. Dr. M. Sallah*