Mathematics Department , Faculty of Science ,Tanta University		
Branch: Math. Dept.		Sub-branch : Mathematics
Examination for : Level three		Term: first Term 2017-2018
Course Title: Algebra (1)		Course Code: MA3107
Date: 24/12/ 2017	Total Mark: 150	Time Allowed: 2 Hours

Question 3 (30 marks):

a) **Mach each** sentence from column A with a suitable one in column B **(6marks)**

A	B
a) Use Cayley's Theorem	1) to find all types of abelian groups of order p^2q^2, where p and q are prime numbers
b) Use 1st Isomorphism Theorem	2) to find a permutation group isomorphic to the group $U(8)$.
c) Use The Fundamental Theorem of finite abelian groups	3) to Prove that $\Gamma(G) \cong G/Z(G)$, where $Z(G)$ is the center of a group G and $\Gamma(G)$ is the set of all its inner automorphisms.

b) **State two theorems** of column A and then **use them to do the required** task in column B **(24 marks)**

Question 4 (44 marks every item has 11 marks):

a) **Classify all groups of order 6**

b) **Choose the correct answer**

i) The number of conjugacy classes of the dihedral group D_5 is :

(a) 4 (b) 5 (c) 6 (d) 7

ii) The derived group $D`_n$ of the dihedral group D_n is generated by :

(a) r^2 (b) r (c) r^3 (d) r^4 where r is the rotation with angle $2\pi/n$

iii) Every group of order 42 has a normal subgroup of order:

(a) 2 (b) 7 (c) 3 (d) 6

with our Best Wishes

Examiners	أ.د/ سناء العصار
	د/ إيمان غـريب

Mathematics Department , Faculty of Science ,Tanta University		
Branch: Math. Dept.		Sub-branch : Mathematics
Examination for : Level three		Term: first Term 2017-2018
Course Title: Algebra (1)		Course Code: MA3107
Date: 24/12/ 2017	Total Mark: 150	Time Allowed: 2 Hours

Answer the following questions:

Question 1 (36 marks every item has 12 marks):

Prove or disprove

i) the derived subgroup $G^{`}$ of a group $G$ is the largest normal subgroup whose factor group $G/G^{`}$ is abelain

ii) The number of conjugates of an element x of a group G equals the index of the centralizer of x in G

iii) Let H and K be normal subgroups of a group G: if $K < H < G$, then

$$(G/K)/(G/H) \cong H/K$$

Question 2 (40 marks):

a) **Consider the permutation group S_4.** Find the following :

conjugacy classes, the class equation, the derived subgroup, the center, and a normal series. **(22 marks)**

b) **Complete the following** **(18 marks every item has 2 marks)**

i) If G is a simple group of order 168, then we have .... elements of order 7.

ii) If G is an abelian group, then the conjugate class of an element $g \in G$ is............, the center of G equals................., the derived subgroup is .... and the set of all its inner automorphisms equals..............

iii) The largest possible order for cyclic subgroup of $Z_4 \otimes Z_{12} \otimes Z_{40}$ is...........

iv) A Sylow 5-subgroup of a group of order 250 has order.............

v) A group of order 52 must have either .... or .... Sylow 2-subgroup.

← **Please turn the page over**

1969	Tanta University Faculty of Science Department of Mathematics	

Examination for :		Level 3 – Mathematics 2017-2018	
Course Title: Electro-Magnetostatic		Course Code:	MA3105
Time: 28/ 12/ 2017	Term: First	Total Assessment Marks: 150 M	Time Allowed: 2H

Answer all the following questions:

First question: (35 Marks)

a. State the units of the following quantities:
magnetic flux - electric potential – capacitance – magnetic field - magnetic potential – permittivity and permeability of free space.

b. Consider a circular line charge in the xy-plane in which $\lambda = k\sin\varphi$. Calculate the electric field on the z-axis.

Second question: (40 Marks)

a. Derive the work and energy in electrostatics for ***n*** charges, and also for volume charges distribution.

b. Discuss the method of image for a point charge $\boldsymbol{Q}$ is held a distance d above an infinite grounded conducting plane. Find Q_{inc} and the electric work.

Third question: (35 Marks)

Consider a sphere of radius ***a*** containing charge of constant density so that ρ=constant. inside, while $\rho = 0$ outside. Find the electric potential everywhere.

Fourth question: (40 Marks)

a. Compare between the Electrostatic and Magnetostatic.

b. Find the magnetic potential $\boldsymbol{A}$ and the magnetic induction $\boldsymbol{B}$ for a magnetic dipole.

With best wishes

Prof. Magdy Serwah and Dr. Khaled.M. Elmorabie.

1969

TANTA UNIVERSITY
FACULTY OF SCIENCE
DEPARTMENT OF MATHEMATICS

Course Title: Mathematical Logic and Boolean algebra.	Third level students of Mathematics	Term: First 2017-2018 Course code MA3113
Date : 4 /1 / 2018	Total marks: 1 0	Time allowed: 2 hrs.

Answer the following questions:

Question 1 (25 marks)

a- Show that neither of the following two formulas tautologically implies the other :
$(A \leftrightarrow (B \leftrightarrow C))$,

$((A \wedge (B \wedge C)) \vee ((\neg A) \wedge ((\neg B) \wedge (\neg C)))$. (6 marks).

b– Find a formula in disjunctive normal form (DNF) that is tautologically equivalent to $(A \leftrightarrow B \leftrightarrow C)$. (6 marks).

c– Complete the following (in first order languages):

(i) The terms are those expressions that can be built up from .... and ....

(ii) An atomic formula is an expression of the form P t_1 t_2 t_3........t_n, where P is .... and t_1, t_2, ... , t_n are ....

(iii) The set of wffs is *the* set of expressions that can be built up from the atomic formulas by ....

(iv) *Let α and β be two atomic formulas. The variable x occurs free in* $(\alpha \rightarrow \beta)$ *iff* .... *, while x occurs free in* $\forall v_i\ \alpha$ *iff* ....

(13 marks)

Question 2 (25 marks)

a- Suppose that C is generated from a set B = {a, b, c} by the binary operation f and unary operation g. List all elements of C_2. (11 marks)

b- Rewrite the following formulas in an unabbreviated way that explicitly lists each symbol in order : 1- $\exists x\ Ax \wedge Bx$.   2-$\exists x\ (Ax \wedge Bx)$.   (7 marks).

c- Assume that we have a language with the following parameters:
∀: for all things, N : is a number, I : is interesting , < : is less than , 0 : a constant symbol to denote zero .

(i) Translate into this language the English sentences:

(a) Zero is less than any number.

(b) Not all numbers are interesting.

MA3101

جامعة طنطا	**المستوى: الثالث (ش. رياضيات)**	**دور يناير ٢٠١٨**
كلية العلوم	**المادة: تحليل حقيقي**	**الزمن: ساعتان**

أجب عن الأسئلة التالية:

١) أ. عرف المجموعة R واذكر ٥ خواص رياضية لها .

ب. أكمل: ...... = $\|f\|$ حيث $F[0,3] \ni f(x) = \sqrt{\frac{2}{(x+1)(x+3)}}$

٢) أ. أكمل : $\|f\|$ = ... حيث $F[1,3] \ni f(x) = \sqrt{\frac{18}{x(x^2+9)}}$

ب. عرف المجموعة : المفتوحة – المغلقة – الكثيفة مع ذكر أمثلة لها .

٣) اثبت أن $S = \{ \frac{n}{n+2} : n \in N\}$ لها نقطة نهاية وتحقق نظرية ف - بو .

هل S مجموعة (محدودة - تامة – مغلقة – قابلة للعد) ؟ ولماذا ؟ .

٤) أ. اثبت أن المجموعة I قابلة للعد - مغلقة في R .

ب. اذكر متتابعة كوشى من أعداد نسبية تقاربية إلى $\sqrt{2}$ مع توضيح الإجابة.

٥) أ.اثبت أن $I_n = \left[-\frac{1}{n} , \frac{1}{n} \right]$ فترات متداخلة و هل تتحقق خاصية الفترات لها .

ب. عين التغير الكلي V_0^3 f حيث $f(x) = \begin{cases} 3x^2 , 0 \le x \le 1 \\ x + 2 , 1 < x \le 3 \end{cases}$

مع أطيب التمنيات بالنجاح .. د .سعيد أحمد أبوالعلا واللجنة

	TANTA UNIVERSITY - FACULTY OF SCIENCE DEPARTMENT OF MATHEMATICS		
1969	**Final Term Exam for the First Semester 2017-2018**		
	Course Title:	Special Relativity	**Course Code:** MA3111
	Date: 15-1-2018	**Total Mark:** 150 Marks	**Time Allowed:** 2 Hours

Answer all the following questions:

1) a- Find the Lorentz transformation of velocities?

b-A rod of a proper length equal to 100 cm moves with a velocity 0.8 C in a direction inclined at an angle 60° to its own length. Determine its moving length?

2) Frame $\acute{S}$ has a speed $v = 0 \cdot 4C$ relative to S. Clocks are adjusted so that $t = \acute{t} = 0$ at $x = \acute{x} = 0$. (a) An event occurs in $S(x,t)$ when $x = 60\, m,\ t = 3 \times 10^{-7}$ sec. Calculate the time for occurring the event and space in $\acute{S}(\acute{x}, \acute{t})$? (b) If another event occurs at S $(20\text{m},\ 5 \times 10^{-7} sec)$.What the time interval between the events as measured in $\acute{S}$?

3) a- Derive the Lorentz transformation of mass?

b-Show that a particle which travels at the speed of light must have zero rest mass?

4) a- Let T_{ijk} is a tensor. Show that T_{iik} is not tensor?

b- prove that the Kronecker delta δ^i_j is a mixed tensor of rank 2?

c- A_{ij} is a skew symmetric tensor, verify that

$$B_{ijk} = \frac{\partial A_{ij}}{\partial x^k} + \frac{\partial A_{jk}}{\partial x^i} + \frac{\partial A_{ki}}{\partial x^j} \quad \text{transform as tensor?}$$

5) a-A contravariant tensor has components (x, xy, z^2) in cartesian coordinates. Find its covariant components in spherical coordinates (r, θ, φ)?

b- $A^{\ell m}_{rs}$ and B^{abc}_{de} are two tensors. Prove that their multiplication is a tensor and find also the number of possibility of times of inner product?

c-prove that $\frac{\partial}{\partial x^m} g^{pq} = -g^{pn}\, \Gamma^q_{mn} - g^{qn}\, \Gamma^p_{mn}$

(Best wishes)

Examiners:	**1- Prof. Dr. Mohamed Omar Shaker 2- Dr. Afaf Mohamed Farag**

المادة : نظرية المعادلات التفاضلية
الزمن : ثلاث ساعات

جامعة طنطا
كليه العلوم
قسم الرياضيات

اختبار طلاب كلية العلوم قسم الرياضيات

Final Examination -First Semester 2017/2018

Answer The Following Questions

First question :

1-Solve the following (I .V.P)

$$\frac{dy}{dx} - 2x = 2xy \ , y(0) = 0$$

2-- Define Laplace transform , and Find the following :

$$: (i) L\{2x^3 - 4x + 3 - 2e^{3x}\} \quad (ii) L\{2\sin 3x - 4\cos 5x\}$$

3- prove that the following system:

$$\frac{d^2y}{dx^2} + \lambda u(x) = 0 \ ,$$
$$u(0) = 0 \ , u(\Pi) = 0$$

Is regular strum leauville system

Second question :

1- Find the general solution of the following system:

$$\frac{d\underline{y}}{dt} = \begin{pmatrix} 3 & 8 \\ 1 & 1 \end{pmatrix} \underline{y}(t)$$

2-Solve the following (B .V. P)

$$\frac{d^2y}{dx^2} + y - x = 0 \ , 0 \le x \le \frac{\Pi}{2}$$
$$y(0) = 2 \ , y(\frac{\pi}{2}) = 1$$

3-Solve the following Equations:

$$(i)\ y'' + 4y = 0 \ \ y(0) = 1, \ y'(0) = 2 \ \ by \ \ u\sin g \ \ Lablace \ \ transform$$

''

with the best wishes for success