



University of Technology
Department of Applied Sciences
Final Examination 2016/2017



Subject : Abstract Algebra

Branch: Mathematics and Computer Applications

Examiner : Dr. Anwar Khaleel

Year: 3rd

Time : 3 hours

Date : 29-5-2017

Answer only five (5) Questions

ملاحظة: الاجابة عن خمس أسئلة فقط ولكل سؤال 14 درجة.

Q₁: (A) Let $R = (Z_{12}, +_{12}, \cdot_{12})$.

1. Find all maximal ideals of R .
2. Evaluate $\text{char.}(R)$.
3. Is R a field? Why?

(B) Let G be a set of all real numbers except 0. Define $*$ on G by $a * b = |a|b$, where $|a|$ is the absolute value of a . Is $(G, *)$ a group?

Q₂: (A) State only: Krull-Zorn theorem, Lagrange theorem.

(B) Prove that: 1. Every Boolean ring is commutative.

2. Every field is integral domain.

Q₃: (A) Prove that

1. There is no simple group of order 200.
2. Every group of index 2 is normal.

(B) Define the integral domain ring. Is the product of integral domain rings also an integral domain?

Q₄: (A) Prove or disprove each of the following

1. Every prime ideal is maximal.
2. Every subring is ideal.
3. The cancellation law for multiplication holds in any ring.

(B) Define the following: Cyclic group, P-Group, Normal group, Skew field.

Q₅: (A) Let R be a ring with identity. Define $g: Z \rightarrow Z$ by $g(x) = x$. 1, $\forall x \in Z$. Is

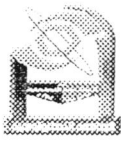
g a homomorphism? What's $\text{ker}(g)$?

(B) Define the triangle group. Then 1. Find all subgroups of it.

2. Is it abelian? Why?

Q₆: (A) Let G be a group which has order $2p$, where p is prime number. Prove that every proper subgroup of G is cyclic.

(B) Let I be a maximal proper ideal of commutative ring with identity R . Prove that R/I is a field.



Subject : Programing (Matlab)
Branch :Appl-Math
Examiner: A.M Shukur

Class : third class
Time : 3 hours
Date : 3/ 5 /2017

Note: Answer only five questions, (10 mark for each one)

Q1)what is the output (result) of the following sets of commands:

| | | | | |
|---|--|--|--|---|
| <pre>>> x = 5; >> while x < 25 >> disp(x) >> x = 2*x - 1; >> end</pre> | <pre>>>A=[[1 2 3]';[3 2 1]']... [2 1 3]'; B=A; for j=2:3: for i=j:3, B(i,:) = B(i,:) - B(j-1,:); ... *B(i,j-1)/B(j-1,j-1); end : end</pre> | <pre>>> x = 1; y = 2; while y < 5: z(x) = 2 .* y; x = x + 1; y = y + 2; end</pre> | <pre>>>JJ=0; for II=1:2:5 JJ=JJ+1; End</pre> | <pre>>> syms n r ; >> diff(r*sin(n), n,2)</pre> |
|---|--|--|--|---|

Q2)A- write m-file which asks user to enter nth- real numbers, then it tells the user (after each number) if this number odd or even?

B)-write m-file to help user to enter three numbers and it will rewrites these numbers from Smallest one to largest one? Tell the user about the working of this m-file? Don't use sort?

Q3) by using true (T) or false (F) marks , answer the following questions:

- a) Using (clc) to clean C.W without memory and (clear) to clean memory only.
- b) (Whos) to List current variables but (who) lists the variables in the current workspace.
- c) (save test.mat). to save all variables from the C.W to file (test.mat).
- d) load('hand.mat', 'y') to load all variables which is starting by y, from file hand to C.W.
- e) The matrices that have two dimensions, must be square or rectangle form only.

Q4) write m-file to sort data into odd and even, it will do the following:

- 1- It asks user to choose positive real number n, which is the number of user's data.
- 2- It gives to user time to enter the data one by one.
- 3- It will test the enter-data as the following.
- 4- If data is zero the user will read n must be positive and he gets other chance. x will save even data and y will be zero or y will save odd and x will be zero?

Q5) Find the result of Z at the last command for the following groups:

| | | | | |
|---|---|---|---|---|
| Group 1 X = [1 3 5 7 9]; Y = [2 4 6 8 10]; >> Z=X*Y | Group 2 X = [1 3 5 7 9]; Y = [2:4:6:8:10]; >> Z=X*Y | Group3 X= diag(eye(3)).*3; K=ones(3)+eye(3); >>Z= diag(X)+K | Group 4 X= zeros (3); X=X+diag(1:3); >> Z= X(3,1:3) | Group 5 X=linspace(1,5,5); Y=(1:5); >> Z = X.*Y |
|---|---|---|---|---|

Q6)A- write commands on C.W to do the following :

- 1- enter the two polynomials ; $P1=2X^3 -3X^2 + 4X -6$; $P2= 4X^4 - 2X + 5$,
- 2- to Calculate $Z=P2/P1$; 3- to find $P1(2)$; 4- to find zeroes of $P2$; 5- to find $P1P2?$

B- write the Matlab commands which is equivalent with each mathematical expression:

| | | | | |
|--|---|--|----------------------------------|--|
| $y = \int_a^b f(x)dx;$ $f(x)=2x^2+\cos^{-1}(x)+e^x$ | $y'' + 4y' + 3y=3e^{-2t}$ $y'(0)=-1; y(0)=1$ Find solution y(t) | $9A+5B=0$ $2A-6B=0$ Find A and B | $X=1; X=2; X=3$ Find $P_3(X)$ | $P_4(x)=x^4-2x^2+3x$ Find $P'(x)$. |
|--|---|--|----------------------------------|--|

Good luck