Ministry of Higher Education
& Scientific Research
Al-Muthanna University
College of Science
Dep.of mathematics
and computer applications

Subject: Group Theory I
Stage: 2nd
Date: / 01 /2018
Time : 3 Hours

26. 01. 2018

((Assessment of the final exam for the first semester))
Academic year 2017-2018

45

Q1// Any two cyclic groups of the same order are isomorphic.

i) Prove that. **[12 mark]**

ii) Give an example (with solution).

Q2) **Prove or disprove:**

i. non- abelian groups has no normal subgroups. **[12 mark]**

ii. Every infinite cyclic group is isomorphic to $(\mathbb{Z}, +)$.

iii. Let f be a homo. Then ker (f) = {0}.

Q3// Let (G, *) be a group , then

i Define the conjugate element in G **[12 mark]**

ii. Prove that the conjugate relation is equivalent.

iii. If $G = S_3$. Find the conjugate to (2 3)

Q4// a. Let f: (Z ,+)→((R-{0},.), defined by:

$$f(n) = \begin{cases} 1 & \text{if } n \text{ is even} \\ -1 & \text{if } n \text{ is odd} \end{cases}, \forall n \in \mathbb{Z}$$ **[12 Mark]**

i.Tell whether f is homomorphism.
ii.Find ker(f)

b. If f is a homomorphism from (G , *) into (G′, o), then prove that $f(e) = e'$, where e, e' are the identity of G, G′ respectively.

Q5// a. State and prove Cayley theorem.

b. If (H, *) is normal subgroup in a group (G, *). **[12 Mark]**
Prove that $(G/H, \otimes)$ is a group.

Lecturer
Asst.lecturer Zaid AL-Saeed

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Ministry of Higher Education
& Scientific Research
Al-Muthanna University
College of Science

Subject: C++ Programming
Stage: Second
Date: / /2018
Time : Three hours 24. 01. 2018
Dept: Mathematics and Computer Applic

((Assessment of the final exam for the first semester))
Academic year 2017 -2018

45

Q1: a- explain C++ program development process. (4marks)
b- what is the skeleton of C++ program with example (4marks)

Q2: a- write C++ program to read student mark and check whether it is equal or greater than 60 and print"good" otherwise print "fail". (3marks)

b-write the following equation as C++ expression:

1- $f = a + b\sqrt[2]{s + \cos(3)}$ 2- $s = log\beta + \frac{1}{2}\, ln\sqrt[3]{13}$

3- $S = \frac{\sqrt{x^2+2\sin(4)-\left(\frac{5}{x}\right)}}{x+\sqrt{a^2+b^2}}$ (3marks)

c- what are statements explain with example. (2marks)

Q3: a- re-write the following statements by using in brackets : (4marks)

```
1-{ int a,b;                                   (while)
   For(a=1;a<=3;a++)
   For(b=1;b<=4;b++)
   Cout<<a*b;}
```

```
2-{int s=1;
   Do{                                         (switch)
  If(s==1)  cout<<"Iraq"<<endl;
  Else If(s==2)  cout<<"welcome to Iraq"<<endl;
  Else  If(s==3)  cout<<"good luck"<<endl;
  Else cout<<"information"<<endl;
  s++; }while(s<4);
```

b- state and correct the error in the following segments: (4marks)

```
1-  for i=5,i<=3,i—
      cut<<I,
       i=+5;
```

```
2-swtch(j)
   Cas 3;sum(4,3);braek:
   Cas4. Mult(2,4):default.
```

```
3-whle(i>=3)
   S=i+3x;
   Cim<<x.
```

```
4- #includ<iosteem.h>
  Mian()
  [ x;
    Cout<<x;
    Cin>>x;]
```

Lecturer
Maryam Ghazi Ali

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Head of Department
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Q4: a- what is the recursive function: (2marks)
b- Write C++ program to output: (3marks)

4321
321
21
1

c- write C++ program to calculate summation by using function: (3marks)

$$\text{sum}=1-\frac{x^2}{2!}+\frac{x^4}{4!}-\dots\frac{x^n}{n!}$$

Q5: **(choice two only)**
a-Define array, what are the types of array explain them with Example. (4marks)
b-write C++ program to read array a[13]then print the inverse of array. (4marks)
c- write C++ program to read 2D array [3*3] then replace first row with second column (4marks)

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Department of Mathematics
And Computer Applications

Subject: Linear Alge
Stage: Second
Date: / /2018
Time: 3 hr

22. 01. 2018

((Assessment of The Final Exam for The First Semester))
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Note: For each question 12 marks.

Q1: a- Let M_1 and M_2 are subspace of vector space M, then prove or disprove:

1- $M_1 \cap M_2$ is subspace of M.

2- $M_1 \cup M_2$ is subspace of M.

b- Let W be the set of all polynomials of degree exactly 3 then $W \subseteq P_3(t)$, is W is subspace of $P_3(t)$? Why?

Q2:1- Let $S = \{(1,2,1), (2,9,0), (3,3,4)\} \subseteq \mathbb{R}^3$, Prove S is basis for $\mathbb{R}^3$.

2- Let $S = \{(0,2,2), (1,2,0)\}$ and let $M = \{(x,y,z): 2x - y + z = 0\}$, show that the set S is spans M.

Q3: Let V be a vector space over a field F, if the set $S = \{A_1, A_2, \dots, A_n\}$ of vectors of V is linearly independent, then prove that none of vectors $A_1, A_2, \dots, A_n$ can be zero vector.

Q4: By Gauss Jordan reduction procedure solve the following system:

$$x_1 + 3x_3 - 4x_4 = 1$$
$$2x_2 + 3x_3 = 2$$
$$2x_3 + 2x_4 = 4$$
$$2x_1 - 6x_3 + 9x_4 = 7$$

Q5: Find the column rank of the matrix:

$$\begin{bmatrix} 1 & 2 & -3 & -1 \\ 0 & 0 & 1 & -2 \\ 3 & 0 & -1 & 3 \end{bmatrix}$$

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أ.م. موسى مكي كريدي

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GOOD LUCK

Ministry of Higher Education
& Scientific Research
Al-Muthanna University
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Department of mathematics &
computer applications

20. 01. 2018

Subject: Ordinary differential equations I
Stage: second
Time: 3 hours
Date: / /2018

((Assessment of the final exam for the first semester))
Academic year 2017-2018

45

20 01 2018

Hint : Choose only 10 equastions

Q1\\ Solve the following differential equation

$$\frac{dy}{dx}=\frac{2x+2xy^2}{y+2x^2y}.$$

**********(6 marks)

Q2\\ Find the solution of

$$(x+y\sin(t))\,dx=x\sin(t)\,dy,\quad y=tx,\quad y(1)=\frac{\pi}{2}.$$

**********(6 marks)

Q3\\ Solve the following differential equation

$$y(x-1)^{-1}dx+\left(\log_e(x-1)+\frac{1}{y}\right)dy=0$$

**********(6 marks)

Q4\\ Solve

$$\frac{dy}{dx}\left(\frac{dy}{dx}+y(x)\right)=x(x+y(x)).$$

**********(6 marks)

Q5\\ Find the solution of

$$y''+2y'-3y=0$$

**********(6 marks)

Q6\\ Determine the type of the following differential equation and solve it

$$y''+3y'=3x^4+x^2e^{-3x}+\sin(3x).$$

**********(6 marks)

Q7\\ Solve the following differential equation

$$x^2y''-xy'+4y=\cos(\log(x)).$$

**********(6 marks)

turn page please

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20. 01. 2018

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Q8\\ Find the solution of following differential equation

$$(y + xy^2)dx = (x^2 y - x)dy.$$

**********(6 marks)

Q9\\ Solve the following differential equation

$$y = 2px + p^3, \quad \text{where } p=dy/dx.$$

**********(6 marks)

Q10\\ Solve the following differential equation

$$\frac{dy}{dt} + \frac{3y}{t} = 2t.$$

**********(6 marks)

Q11\\ Find the differential equation if general solution is:

$$y = ae^{2x} + be^{x}$$

**********(6 marks)

Best of luck

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Subject :Probability&Statistic
Stage :Second stage
Date: / /2018
Time : 3 hours

18. 01. 2018

((Assessment of the final exam for the first semester))

Academic year 2017 -2018

45

ملاحظة :- الإجابة على خمسة أسئلة فقط ولكل سؤال 12درجة

س 1 :- ما الفرق بين كل مما يأتي

1- البيانات الكمية (Quantitative data) و البيانات الوصفية (Qualitative data)

2- المشاهدة (Observation) والقيمة الإحصائية (Variate)

3- العرض الجدولي (Tabular presentation) والعرض البياني (Graphic presentation)

س 2 :- أعرض البيانات التالية في جدول تكراري ذو فئات متساوية حيث تمثل هذه البيانات علامات 15 طالب وطالبة في أحد امتحانات الإحصاء (42,43,48,38,45,38,42,37,39,44,37,46,43,38,37) ثم احسب التكرار النسبي ؟

س 3 :- إذا كانت علامات أحد الطلبة في ثلاثة امتحانات هي $x_1 = 80, x_2 = 70, x_3 = 75$ فأحسب الوسط الحسابي إذا علمت أن أهمية آخر امتحان يمثل مثلي وزن الامتحانين الأول والثاني ؟

س 4 :- لجدول التوزيع التكراري التالي

الفئات	13L-15L	11L-13L	9L-11L	7L-9L	5L-7L	3L-5L	L-3L
التكرارات	2f	4f	6f	8f	6f	4f	2f

تحقق مما يلي :- 1)إن الوسيط لهذا التوزيع مساو إلى 8L مهما كانت قيمة f ؟ 2) $\overline{X} = M_o = M_e$ ؟

س5 :- احسب المنوال بطريقة العزوم للجدول التكراري الآتي :-

الفئات	2-7	8-13	14-19	20-25	المجموع
التكرارات	5	15	10	5	35

س6 :- برهن أن $\sum_{i=1}^{n}(x_i - \bar{x})^2 \le \sum_{i=1}^{n}(x_i - a)^2$ ومتساوية فقط إذا كان $\bar{x} = a$ لكل $a \in IR$ ؟

Best of luck

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Ministry of Higher Education
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Subject: data bases design
Stage: 2nd year
Date: / /2018
Time : 3 hours
Dept.: Math& Computer Applications

16. 01. 2018

((Assessment of the final exam for the first semester))
Academic year 2017-2018

45

***Note: for each question 8 marks.**

Q1// A) define the following terms. (8 Marks)

1- primary key .
2- hard failure .
3- DBMS.
4-partition data allocation.

B) what are the conditions of the dead lock in DDB,explain it.

Q2// A) briefly explain the data replication types in distributed data base . (8 Marks)

B)) in commit protocols there are some transmitted message ,describe each of the following messages and specify the sender and receiver.

"Ready","Golobal commit","prepare","Abort Ack".

Q3// A) fill the following blanks: (8 Marks)

1- The attributes in E/R diagram are represented by …….. .
2- the process of reapplying all the changes made by the transaction is called…….. .
3- one of the data base models is created to overcome the problems made by flat file data bases is called ……
4- …….. . is the type of failures that causes the loss in volatile memory.

B) Write about prepare phase in' two Phase Commit Protocol' .

Q4// A) choose the correct answer: (8 Marks)

1- the slave site send 'commit ack' in(one phase commit,two phase commit, Three phase commit protocol ,all of them).
2- Reduction in data redundancy is one of the(file system disadvantages,data base advantages,data base Issues,all of them).
3- different site run at the different DBMS in (homogeneous system,heterogeneous system, network data model ,all of them)
4- the process of division the relation in to attributes is(vertical fragmentation,horizontal fragmentation,mixed fragmentation ,all of them)

B)what are the data fragmentation strategies?

Q5// A) Write note about the roll back and roll forward in commit protocols . (8 Marks)

B) Explain the DDBMS architecture,show the responsibility of TM,DM,TC.

Best of luck

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Subject: Advance Calculus I
Stage: Second

Date: / /2018
Time: Three Hours

14. 01. 2018

45

((Final Exam For The First Semester))
Academic Year 2017-2018

Q1)(a) Verify Green's theorem in the plane for $\oint_C (3x^2 - 8y^2)dx + (4y - 6xy)dy$ where C is the boundary of the region $y = \sqrt{x}$ and $y = x^2$.

(b) Find the area lying inside the circle $r = asin\theta$ and outside the cardioid $r = a(1 - cos\theta)$

Q2)(a) Find the volume enclosed between the two surface $z = 8 - x^2 - y^2$ and $z = x^2 + 3y^2$

(b) Prove that: $\iint f(x,y)dydx = \iint f(r,\theta)rdrd\theta$.

Q3)(a)(i) Verify that : $f_{xy} = f_{yx}$ when $f(x,y) = lnx \tan^{-1}(x^2 + y^2)$

(ii) If $f(x,y,z) = (x^2 + y^2 + z^2)^{-\frac{1}{2}}$ prove that $\frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2} + \frac{\partial^2 f}{\partial z^2} = 0$

(b)Prove by using definition $f(x,y) = (x^2 + 2y)$ is continuous at (1,2).

Q4)(a) Use the total differential to estimate: $(5.12)^2(6.85) - 3(6.85)$

(b) Prove that the volume of sphere of radius a is : $\frac{4}{3}\pi a^3$

Q5)(a)Calculate $\int_c F(x) \cdot dX$,where $F(x,y) = xyi + ye^x j$ and C is the rectangle joining Points (0,0) ,(2,0),(2,1),and (0,1) if C is traversed in the counterclockwise direction.

(b)Find the mass and of plate which is formed by coordinate planes and plane $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$, the density is given by $\rho = kxyz$.

Q6) Evaluate : (i) $\int_{-\infty}^{\infty} e^{-x^2} dx$ (ii) $\int_0^a \int_{\sqrt{ax}}^a \frac{y^2}{\sqrt{y^4 + a^2x^2}} dydx$ (iii) $\int_0^{\infty} \int_0^x xe^{\frac{-x^2}{y}} dydx$

(iv) $\int_1^2 \int_1^{x^2} \frac{x}{y} dydx$

Note: 10 Marks for Each Question

Good luck

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