



26.01.2018

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

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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 $f: (\mathbb{Z}, +) \rightarrow (\mathbb{R} - \{0\}, \cdot)$, defined by:

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

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

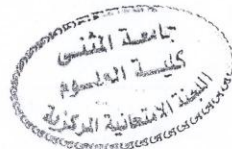
b. If f is a homomorphism from $(G, *)$ into (G', \circ) , then prove that
 $f(e) = e'$, where e, e' are the identity of G, G' respectively.

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.

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

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

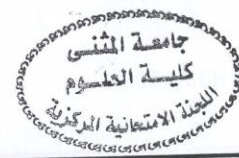
- c- what are statements explain with example. (2marks)
Q3: a- re-write the following statements by using in brackets : (4marks)

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

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

1- for i=5,i<=3,i-- cut<<1, i+=5;
2-switch(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;]

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24. 01. 2018

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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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Academic year 2017-2018

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:

$$x_1 + 3x_3 - 4x_4 = 1$$

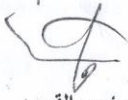
$$2x_2 + 3x_3 = 2$$

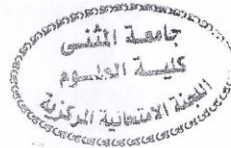
$$2x_3 + 2x_4 = 4$$

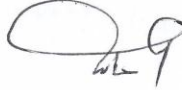
$$2x_1 - 6x_3 + 9x_4 = 7$$

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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GOOD LUCK



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Hint : Choose only 10 equations

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

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

***** (6 marks)

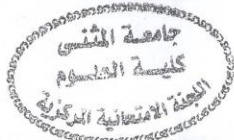
Q7\\ Solve the following differential equation

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

***** (6 marks)

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Q8\\ Find the solution of following differential equation

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

***** (6 marks)

Q9\\ Solve the following differential equation

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

***** (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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18. 01. 2018

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

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

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

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

س 5 :- احسب المنوال بطريقة العزوم للجدول التكراري الآتي :-

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

س 6 :- برهن أن $\sum_{i=1}^n (x_i - \bar{x})^2 \leq \sum_{i=1}^n (x_i - a)^2$ ومتساوية فقط إذا كان $\bar{x} = a$ لكل $a \in IR$ ؟

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***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", "Global 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)

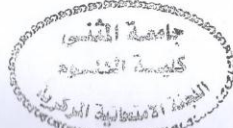
B)what are the data fragmentation strategies?

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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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 $r = a \sin \theta$ 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: $\iint f(x, y) dy dx = \iint f(r, \theta) r dr d\theta$.

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

(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 $\int_C F(x, y) \cdot dX$, where $F(x, y) = xyi + ye^xj$ 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 $\rho = kxyz$.

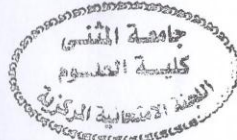
Q6) Evaluate: (i) $\int_{-\infty}^{\infty} e^{-x^2} dx$ (ii) $\int_0^a \int_{\sqrt{ax}}^a \frac{y^2}{\sqrt{y^4 + a^2 x^2}} dy dx$ (iii) $\int_0^{\infty} \int_0^x x e^{-\frac{x^2}{y}} dy dx$

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

Note: 10 Marks for Each Question

Good luck

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