Ministry of Higher Education
& Scientific Research
Al-Muthanna University
College of Science
Department of Mathematics
and computer applications

Subject: Functional Analysis I
Stage: Fourth stage
Date: 1 / 7/2024
Time: 3 Hours

1 JUL 2024

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

Academic year 2023 -2024

45

Q1/ Define and given an example:-

1) Symmetric set.
2) Convergence sequence.
3) Sequentially continuous.
4) Linear function.

----------(12 Marks)

Q2/ If $f: X \to Y$ is a linear function, and B is a convex set in Y. Then, $f^{-1}(B)$ is a convex set in X.

----------(12 Marks)

Q3/ Discuss of the following statements:-

i) Subspace and normed space.

ii) Finite dimensional and complete.

----------(12 Marks)

Q4/ Prove or disprove:-

a) Let A be a subset of normed space X. If $x \in \inf(A)$, $y \in \overline{A}$, then $\lambda x + (1-\lambda)y \in \inf(A)$ for all $0 < \lambda < 1$.

b) In a normed space, the limit point of sequence is unique.

----------(12 Marks)

Q5/ Show that:-

Let $X = l^{\infty}$, and define the function $\|.\|: l^{\infty} \to \mathbb{R}$ by $\|x\| = \sup_i |x_i|$ for all $x = (x_1, x_2, x_3, \dots, x_n, \dots) \in l^{\infty}$. Show that l^{∞} is a Banach space.

----------(12 Marks)

Examiner
Assist. Prof. Dr. Malik Al-Muhja

Head of department
Assist. Prof. Dr. Rafid H. Buti

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

Subject: C++ programming language
Stage: second
Date: / /
Time:Three Hours
Dept: Mathematics and Computer Applications

((Assessment of the final exam for the first semester))
Academic year 2023-2024

45

(4marks)

Q4\\A- re-write by using between brackets

1-# include <iostream.h>
void main( )
{ int count = 1; int sum = 0;
while (count <= 99)
{ sum = sum + count;
count = count + 2; }
cout << "sum is: " << sum << endl;}

(for-loop)

2-#include <iostream.h>
void main( )
{ int Z, x;
cout << "Enter X value \n";
cin >> x;
if (x < 0)
Z= x + 5;
else if (x == 0)
Z= cos(x) + 4;
Else
Z= sqrt(x);
cout << "z is " << z; }

(switch)

B-Write C++ program segment to read array[13] and print it, then add 3to each array element equal to 3,print it then find maximum and minimum value in it and print them (4marks)

C- State the types Of Statements with example. (4marks)

Best Of Luck

كلية العلوم
قسم علوم الرياضيات
وتطبيقات الحاسوب
اللجنة الامتحانية

Lecturer
Maryam G. Ali

Head of Department
Dr.Rafid Habib Buti

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

Subject: Complex Analysis I
Stage: 4th
Date: 30/6/2024
Time : 3h

30 JUN 2024

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

45

Academic year 2023-2024

Note \\ 12 M for every question

ملاحظة \ الاجابة بالقلم الرصاص

Q1) State and prove First Fundamental theorem of algebra ?

Q2)State and prove First(Gussn Mean Value Theorem)

Q3) find the harmonic conjugate of the function

$e^{-x}u = e^{-2x}(x\sin y - y\cos y)$?

Q4)find the following integral $\int_C \frac{18z^2-2iz+8}{2(z^3-z)}\,dz$, where

1) $C: |z| = 4$

2) $C: |z| = \frac{1}{2}$

Q5) find the following integral $\int_C \frac{z^3-2z^2+3z}{z(z-1)(z+2)^3}\,dz$, where

1) $C: |z| = \frac{3}{4}$

2) $C: |z| = \frac{1}{2}$

3) $C: |z| = 3$

Best of luck

Lecturer
Assist. Prof. Dr. Rafid H.Buti

Head of Department
Assist. Prof. Dr. Rafid H.Buti

قواعد بيانات

Ministry of Higher Education & Scientific Research
Al-Muthanna University
College of sciences
Department Of Mathematics and Computer Applications

Subject: Design Database
Stage: 2nd stage
Date: \ /7/2023
Time: 3 hours

1 JUL 2024

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

Academic year 2023-2024

45

Q1\\ A- Choose the correct answer: (3 Marks)

1. In Hierarchical Model of Database, data gets stored in----------

   a) parent-children relationship nodes b) Records c) Row and Colum

2. Fragmentation means the Data can be divided into ---------- or ----------for physical storage
   a) Data or Sites b) pieces or fragments c) Horizontal or Vertical fragmentation
3. Architecture of DDB consists of different levels of ----------

   a) Distribution global b) distribution transparency c) distributed database

B\\ what are the different levels of abstraction in the DBMS? (5 Marks)

Q2\\ A- Explain the difference between a weak and a strong entity set. (4 Marks)

B- A university registrar's office maintains data about the following entities:

- courses, including number, title, credits, syllabus, and prerequisites;
- course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom;
- Students, including student-id, name, and program;
- Instructors, including identification number, name, department, and title.
- Enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled.

Construct an E-R diagram for the registrar's of-all assumptions that illustrating the use of all entity sets listed (4 Marks)

Q3\\ What are categories of end users? (6 Marks)

Q4\\There are two types of Homogeneous Distributed Databases, mention it? (5 Marks)

Q5**A- Define** Data Definition Language **(DDL) and Data** Manipulation Language (DML) (3 Marks)

B- Explain examples of database languages? (4 Marks)

Q6\\Explain distributed database system and features it? (6 Marks)

Best of luck

Lecturer
Sura I.Mohammed Ali

Head of department
Dr .Rafid Habib Buti

Ministry of Higher Education
& Scientific Research
Al-Muthanna University
College of Science
Department of Mathematics
and computer applications

Subject :Advance calculus I
Stage :Second stage
Date:26/6/2023
Time :3 hours

26 JUN 2024

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

45

Academic year 2023 -2024

Q1\\ Find f_x, f_y, f_z at point (2,4,1) for the following functions

A- $f(x,y,z)=\dfrac{x+y+z}{xy+yz+xz}$ B- $f(x,y,z)=x^2e^{yz}\cos z^2+\tan(\dfrac{x}{z})$

---------- (10 Marks)

Q2\\A- Find the tangent to the curve $z=f(x, y)=10-xy$ in the plane $y=4$ at the point (2, 4, 2)

B- Determine whether the following functions is harmonic or not

1) $f(x,y)=e^{-y}\cos(x)$ *2)* $f(x, y)=5x^2y+\log_{10}(xy)$

---------- (10 Marks)

Q3\\Does the following function continuous at the point (3, -3)?

$$f=\begin{cases}\dfrac{x^2-y^2}{x+y} & (x, y) \text{ not along } y=-x \\ 6 & (x, y) \text{ along } y=-x\end{cases}$$

---------- (10 Marks)

Q4\\Find w_s and w_t as function of s and t if

$$w=f(x,y)=\frac{x}{\sqrt{x^2+y^2}}, x=2s-t, y=s+4t$$

---------- (10 Marks)

Q5\\ Find the volume of the region bounded above by the elliptical paraboloid $z=10+x^3+3y^2$ and below by the rectangle R: $0\le x\le 1$, $0\le y\le 2$

---------- (10 Marks)

Q6\\Find the tangent plane and the normal line to the surface $x^2+xyz-z^2=1$ at point $(1, 1, 1)$

---------- (10 Marks)

Best of luck

Lecturer
Lecturer Aws N. Dheyab

Head of department
Assist prof. Rafid H. Buti

وزارة التعليم العالي والبحث العلمي
جامعة المثنى
كلية العلوم
قسم الرياضيات وتطبيقات الحاسوب

44

المرحلة : الاولى
المادة : رياضيات منتهيه
التاريخ : ٢٠٢٤/٦/٢٩

29 JUN 2024

((أسئلة الامتحان النهائي للفصل الدراسي الاول للسنة الدراسية ٢٠٢٣-٢٠٢٤))

ملاحظة // لكل سؤال (١٠ درجات)

س١// أثبت باستخدام مبدأ الاستقراء الرياضي:

$$2.2^3 + 4^3 + 6^3 + \cdots + (2n)^3 = 2n^2(n+1)^2$$

س٢// برهن باستخدام المتجهات على ان قطعة المستقيم الواصلة بين منتصفي ضلعي مثلث توازي الضلع الثالث وقياسها يساوي نصف قياسه .

س٣// اذا كانت $A = \begin{bmatrix} 2 & 3 & 1 \\ 2 & -7 & 4 \end{bmatrix}$ و $B = \begin{bmatrix} 3 & 4 & 5 \\ 1 & 1 & 4 \\ 2 & 1 & 4 \end{bmatrix}$. جد $A.B$.

س٤//حل المنظومة الخطية التالية باستخدام طريقة كاوس للحذف :

$$X_1 + 3X_2 + 2X_3 = 1$$
$$2X_1 - X_2 + 3X_3 = 3$$
$$3X_1 - 5X_2 + 4X_3 = 5$$
$$X_1 + 17X_2 + 4X_3 = -1$$

س٥// بين صحة أو خطأ كل من العبارات التالية :

١- يسمى المتجه $\vec{o} = oi + oj$ بمتجه الوحدة .

٢- المصفوفه العددية هي المصفوفه القطريه التي تكون جميع عناصر القطر الرئيسي متساوية .

٣- يقال للمتجهين $\overrightarrow{W}, \vec{V}$ انهما متعامدان اذا كانت الزاوية المحصورة بينهما صفر او π .

تمنياتي لكم بالنجاح جميعا"

كلية العلوم
قسم علوم الرياضيات وتطبيقات الحاسوب
اللجنة الامتحانية

نداء حسن حاجي

أستاذ المادة :م. نداء حسن حاجي

رئيس القسم: أ.م د. رافد حبيب بطي

Ministry of Higher Education
& Scientific Research
Al-Muthanna University
College of Science
Department of Mathematics
and computer applications

Subject :Linear algebra I
Stage : Second
Date:29/ 6/2024
Time : 3 hours

29 JUN 2024

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

45

Academic year 2023 -2024

NOT : For each question(12) marks

Q1) Answer the following sentences true or false and explain the reason :

(1) The set of all polynomial of degree n is vector space .

(2) It is called vector normalized if $\langle U, V\rangle = 0$.

(3) Let $\{(x_1, x_2, 1), x_1, x_2 \in R\ \}$ under addition and scalar multiplication .

Q2) Prove that $M_1 \cap M_2$ is subspace of a vector space V , if M_1 and M_2 are subspaces of a vector space V .

Q3)Is the following subset of a vector space R^4 linearly dependent or linearly independent $V_1 = (-2,0,0,0)$, $V_2 = \left(0, \frac{1}{2}, 1, 1\right)$, $V_3 = (1,1,0,0)$, $V_4 = (0,3,1,0)$?

Q4) Let $T: R^3 \to R^2$, where $T(x, y, z) = (x + y, x - z)$. Determine whether T is linear transformation or not .

$R^3 \to R^2$
$(x, y, z) \to (x, y)$

Q5) Let $W = \{(x, y): x, y \in R, ax + by = 0\}$, such that a, b is constant . Prove that W is subspace of vector space R^2 .

Best of luck

كلية العلوم
قسم علوم الرياضيات
وتطبيقات الحاسوب
اللجنة الامتحانية

Lecturer
Lecturer :Nidaa Hasan Haji

Head of department
Assist prof. Rafid H. Buti

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

Subject: English Language
Stage: second
Date: ٢٩ ٦ ٢٠٢٤
Time : Three hours
Dept: Mathematics and Computer Applications

29 JUN 2024

((Assessment of the final exam for the first semester))
Academic year 2023-2024

45

Q1\\ Match between the Correct expressions **(12marks)**

why are you wearing a suit	I'm enjoying it
did you have a nice weekend	because I need it for my job
run out of coffee	because I'm going to an expensive restaurant
does your tooth hurt	thirty dollars
how much did you pay for your shoes	I'll go to the dentist today
why are you learning english	buy some more?

Q2\ tick the correct sentences for the following **(12marks)**

1-my parents moved back to england when I was five
my parents move back to england when I was five

2-would you like your teacher
Do you like your teacher

3-she has played since she was six
she has play since she was six

4-he give her a watch that stopped after two days
he gave her a watch that stopped after two days

5-Mona lives in Paris
Mona is living in Paris

6- I think of going to US for our weekend
I 'm thinking of going to US for our weekend

Q3\\choice the correct answer **(12marks)**

1-where..... she come from?
a- does b-is c-was d-did

2- the time expression 'for' go with
a- a couple of day b- nine o'clock c-both a,b

3- in march this year he .....Ben Nevis Britain's highest mountain when he .....
a- clamb,lost b- was climbing,lost c- clims,lost

4- they ..... watching TV in holiday
a- have like b- liked c-is liking d-like

5- the correct question of the following sentence is "I want to the state in 19"
a- when did you go to the state b- when do you go to the state c- when you go to the state

6- he.....to dentist tomorrow
a-go b-will go c-is going d-went

7-I came to .....school by.....bus
a-a,the b-the(x2) c-nothing, the d-noting(x2)

8-the opposite of wonderful is
a-horrible b-poor c-old

9-I'm waiting .....the postman to arrive
a-to b-of c-for d-with

Q4\\Give the verbs of the following nouns: **(12marks)**

Discussion_____ Enjoyment_____

Organization _____ Decision_____

Improvement_____ Government_____

كلية العلوم
قسم علوم الرياضيات
وتطبيقات الحاسوب

Follow

وزارة التعليم العالي والبحث العلمي
جامعة المثنى
كلية العلوم
القسم العلمي : الرياضيات وتطبيقات الحاسوب
المرحلة : الثالثة

Ministry of Higher Education
& Scientific Research
Al-Muthanna University
College of Science
المادة العلمية: لغة فيجوال بيسك
التاريخ: ٢٩/٦/2024

44 اسئلة الامتحان النهائي-الفصل الاول/الدور ( ) للعام الدراسي 2023-2024

29 JUN 2024

س1: عرف مايأتي: (8 درجات)

1- Dim
2- OptionButton
3- Properties Window
4- LoadPicture( )

س2: كيف يمكنك القيام بمايلي (اجب عن اثنان فقط): (8 درجات)

1- توليد رقم عشوائي قيمته بين 1 و 10 ثم اختبار هذا العدد هل هو اكبر من 5 او اصغر من 5 . عندما يكون اكبر من 5 سيطبع على النموذج العبارة "LARGE" اما اذا كان اصغر من 5 سيطبع على النموذج العبارة "SMALL" .
2- لديك عنصر تحكم OptionButton, ماهو الكود البرمجي اللازم بحيث عند اختيار هذا العنص (OptionButton) تظهر الصورة Picture1

س3: حدد فيما اذا كانت العبارات التالية صحيحة او خاطئة (8 درجات)

1- يمكن تغيير خصائص الادوات برمجيا.
2- الامر Form1.visible = True يقوم باخفاء ال Form1.
3- Proprties Window هي النافذة التي تحتوي عناصر التحكم الرئيسية.
4- الخاصية Caption مسؤولة عن تغيير الاسم الظاهر لكل من Label و Command.

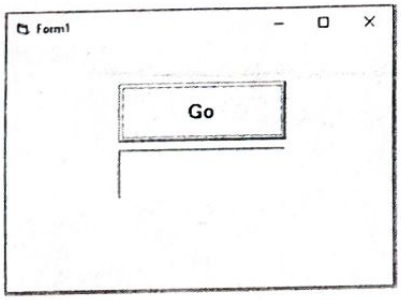
س4: اكتشف الاخطاء في الاكواد البرمجية التالية (اعد كتابة الكود بشكل صحيح): (8 درجات)

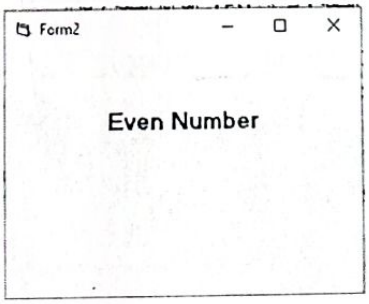
1-	2-

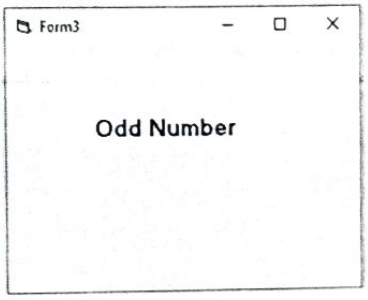
If Option1.Value = 5
Image1.Picture = True
End If
If Option1(1).Value = 6
Image1.Picture = False
End If
	If text1.text = Ali
	Form2.false
	Else
	Form3.false
	End If

س5: اجب عن اثنين مما يأتي: (8 درجات)

1- باستخدام لغة Visual Basic صمم مشروعا للحجز الفندقي "Hotel Bokking".
2- وضح من خلال برنامج الفرق بين المتغيرات المحلية لاجراء معين والمتغيرات العامة على مستوى Project.
3- باستخدام لغة Visual Basic صمم مشروعا يحتوي على ثلاث واجهات Form1, Form2, Form3.
Form1 يحتوي على Text و Command . بحيث عند التنفيذ يجب ادخال قيمة في ال Text, فاذا كانت القيمة زوجية النقر على Command سينقلك لل Form2 اما اذا ادخلنا قيمة فردية فالنقر على Command سينقلك لل Form3







مع اصدق الاماني بالتوفيق

كلية العلوم
قسم علوم الرياضيات وتطبيقات الحاسوب
اللجنة الامتحانية

استاذ المادة
م.د. فهد نعيم نايف

رئيس القسم
ا.م.د رافد حبيب بطي

Ministry of Higher Education
& Scientific Research
Al-Muthanna University
College of Science
Department of Mathematics
and computer applications

Subject :Partial differential equation

Stage :Third stage
Date: 17/ /2024
Time : 3 hours

27 JUN 2024

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

45

Academic year 2023 -2024

Q1\\ Solve the PDE by using Charpit's method

$$p + q\,y = q^2$$

(10 mark)

Q2\\A\ find PDE by eliminating (a) and (b) from

$$Z = x\,y + y\sqrt{x^2 + a^2} + b^2$$ (5 mark)

B\ Solve $x\frac{dz}{dx} + y\frac{dz}{dy} = z - 5\frac{dz}{dx} + \frac{dz}{dx}\frac{dz}{dy}$ (5 mark)

Q3\\ Find the general solution (only two)

1- $\left(D_x^3 - 4D_x^2 + D_x + 6D_y\right)z = 0$ (5 mark)

2- $\left(D_x^3 - D_x^2 D_y - 8D_x D_y^2 + 12D_y^3\right)z = 0$ (5 mark)

3- $x\,\frac{\partial^2 z}{\partial x^2} - y\,\frac{\partial^2 z}{\partial x \partial y} - \frac{\partial z}{\partial x} = 0$ (5 mark)

Q4\\ solve the following PDE (10 mark)

$$(x^2 - y^2 - z^2)Z_x + 2xy\,Z_y = 2x\,Z$$

Q5\\ Find the general equation of a PDE $\left(D_x^2 - D_y\right)Z = 2y - x^2$ (10 mark)

Q6\\ Find the single solution of the following equation (10 mark)

$$Z^2(p^2 + q^2 + 1) = 1$$

Best of luck

Lecturer
Lecturer BANIN SHAKER

Head of department
Assist prof. Rafid H. Buti

Ministry of Higher Education
& Scientific Research
Al-Muthanna University
College of Science
Department of Mathematics
and computer applications

Subject : Topology I
Stage : Fourth
Date: 29/6/2024
Time : 3 hours

29 JUN 2024

45

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

Academic year 2023 -2024

NOT : For each question(12) marks

Q1) Prove or disprove :

(A) $(A \cup B)^0 \subseteq A^0 \cup B^0$

(B) In space (X, τ) ,if $\varphi \neq A \subseteq X$, then $\bar{A} = X$.

Q2) (A) Show that the co-finite topology is topological space .

(B) Let $X = \{a, b, c\}$, and $\tau = \{\varphi, X, \{a\}, \{b\}, \{a, b\}\}$. Find a base for τ .

Q3) Let $f: (X, \tau) \to (Y, \tau')$ be a function. Then f is continuous iff $f^{-1}(F) \in \mathcal{F}$,$\forall\, F \in \mathcal{F}$ Such that $\mathcal{F}$ is family of closed sets in Y .

Q4) (A) Show that $[0,1] \cong [a, b]$, and length is not topological property .

(B) Let (Y, τ_Y) be a subspace of (X, τ), $E \subseteq Y$, E is closed set in (Y, τ_Y) . Then there exist closed set F in (Y, τ) s.t $E = F \cap Y$.

Q5) If (X, τ) be a topological space $A \subseteq X$, then $A \in \tau$ iff $A \in N_x$, $\forall\, x \in A$.

Best of luck

كلية العلوم
قسم علوم الرياضيات
وتطبيقات الحاسوب
اللجنة الامتحانية

Lecturer
Lecturer :Nidaa Hasan Haji

Head of department
Assist prof. Rafid H. Buti

Ministry of Higher Education
& Scientific Research
Al-Muthanna University
College of Science
Department of Mathematics
and computer applications

Subject :Probability and Statistics
Stage :Second stage
Date:27/6/2024
Time : 3 H

27 JUN 2024

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

45

Academic year 2023 -2024

ملاحظة :- الإجابة على كافة الأسئلة ولكل سؤل 12 درجة

س 1 :- ما الفرق بين كل مما يأتي (أختر واحدة)

1- مقاييس النزعة المركزية (Central tendency measures) ومقاييس التشتت (Dispersion measures)

2- المنحنى التكراري (Frequency curve) والمضلع التكراري (frequency polygon)

س 2 :- أعرض البيانات التالية في جدول تكراري ذو فئات متساوية عددها 4 حيث تمثل هذه البيانات علامات 15 طالباً في أحد امتحانات الإحصاء (42,43,48,38,45,38,42,37,39,44,37,46,43,38,37) , كم بالمئة من الطلبة تتراوح درجاتهم ما بين 43 و 45 درجة ؟

س 3 :- أثبت أن في حالة تساوي حجوم العينات $\overline{\overline{X}} = \frac{\sum_{i=1}^{k}\sum_{j=1}^{n_i} x_{ij}}{\sum_{i=1}^{k} n_i} = \frac{\sum_{i=1}^{k} \overline{x_i}}{k}$

س 4 :- أجب ماياتي (أختر فرع للإجابة)

1- إذا ضربنا كل من الأعداد (3,6,2,1,7,5) بالعدد 2 وأضفنا إلى الناتج 5 نحصل على الأعداد (11,17,9,7,19,15) ماهي العلاقة بين الانحراف المعياري والوسط الحسابي لكل من مجموعتي الأعداد الأصلية والجديدة ؟

2- إذا كان توزيع علامات مجموعة من الطلبة ملتو نحو اليمين وفيه الوسط الحسابي $\bar{x} = 75$ والوسيط $M_e = 70$ والمنوال $M_o = 65$ وتم إجراء تحويل خطي عن علامات الطلاب وفق العلاقة $y_i = x_i + 3$ فماهي العلاقة بين الأوساط الثلاثة بعد التعديل ؟

س5 :- لجدول التوزيع التكراري الآتي

الفئات	12L-14L	10L-12L	8L-10L	6L-8L	4L-6L	2L-4L	L-2L
التكرارات	f	2f	4f	8f	4f	2f	f

تحقق مما يلي $\frac{Q_1 + Q_3}{2} = Q_2$

Lecturer
Lecturer Alaa H. Sabri

Head of department
Assist prof. Rafid H. Buti

Ministry of Higher Education
& Scientific Research
Al-Muthanna University
College of Science
Department of Mathematics
and computer applications

Subject :Integral equations
Stage : Fourth stage
Date: 5 / 7 2023
Time : 3 hours

05 JUL 2024

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

45

Academic year 2023 -2024

Q1\\ Classify the following integral equation (for only five) (10 mark)

1- $u(x) = 1 + x^2 \int_0^x (x-t)\, u(t)dt$

2- $u(x) = \frac{2}{3}x + \int_0^1 xt\, u(t)dt$

3- $u(x) = 1 + \frac{x}{4}\int_0^1 \frac{1}{x+t}\frac{1}{u(t)}dt$

4- $u(x) = \frac{-3}{4}x + \frac{1}{5} + \int_0^1 (x-t)^3\, u(t)dt$

5- $u(x) = \int_0^1 (x-t)^2\, u(t)dt$

6- $u(x) = x + \int_0^1 xt\, u\,(t)dt$

Q2\\ Solve the volterra integral equation by using the successive approximation method

$$u(x) = -1 + e^x + \frac{1}{2}x^2e^x - \frac{1}{2}\int_0^x t\, u(t)dt$$ (10 mark)

Q3\\ Show that $u(x) = x + \frac{1}{24}$ is a solution of the following fredholm integral equation $u(x) = x + \int_0^{1/4} u(t)dt$ (10 mark)

Q4\\ Solve the Fredholm integral equation by using the modified Adomian Decomposition method (ADM)

$$u(x) = 1 + \sin x - x - \frac{x^2}{2}\int_0^{\pi/2} x\, t\, u(t)\, dt$$ (10 mark)

Q5\\ Solve the Fredholm integral equation by using the Direct Computation method

$$u(x) = \frac{1}{3}x + \sec x \tan x - \frac{1}{3}x\int_0^{\frac{\pi}{3}} u(t)dt$$ (10 mark)

Q6\\ Use the modified decomposition method (MDM) to solve the following Volterra – Fredholm integral equation

$$u(x) = \cos x - \sin x - 2 + \int_0^x u(t)dt + \int_0^{\pi} (x-t)\, u(t)dt$$ (10 mark)

((Good Luck))

Lecturer
Lecturer BANIN SHAKER

Head of department
Assist prof. Rafid H. Buti

Ministry of Higher Education
& Scientific Research
Al-Muthanna University
College of Science
Department of Mathematics
and computer applications

Subject :Ordinary differential equations I
Stage :Second stage
Date: 5/7/ 2023
Time : 3 hours

05 JUL 2024

45

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

Academic year 2023 -2024

Q1\\ Solve the following DE $(D^2 - 2D + 1)(D^4 - 16)y = 0$ (10 mark)

Q2\\ -A\ Solve the equation by separation variables $\frac{dy}{dx} = x + xy^2$ (5 mark)

-B\ Find the general solution $(D^4 - 2D^3 + D^2)y = 0$ (5 mark)

Q3\\ solve the exact DE $(r^2 \sec 2\theta \tan 2\theta)d\theta + r(\sec 2\theta + 2)dr = 0$ (10 mark)

Q4\\ Solve $y'' = 1 + (y')^2$ (10 mark)

Q5\\- A\ Prove that these $y = (c_1 + c_2\, x)e^x$ represent a solution to the differential equation $y'' - 2y' + y = 0$ (5 mark)

-B\ Solve the homogenous equation $6xy\, dx + (3x^2 - 2y^2)dy = 0$ (5 mark)

Q6\\ Find the general solution

1) $\frac{dx}{dt} + y = x$ 2) $\frac{dy}{dt} = 3y$ (10 mark)

Best of luck

Lecturer
Lecturer : banin shaker

Head of department
Assist prof. Rafid H. Buti

Ministry of Higher Education
& Scientific Research
Al-Muthanna University
College of Science
Department of Mathematics
and computer applications

Subject :Mathematical Statistics 1
Stage :Third stage
Date: 3/7/2024
Time : 3 H

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

03 JUL 2024

45 2

Academic year 2023 -2024

Note : 10 marks for each question(Choose 6 only)

Q1:- If X be a r.v. with m.g.f. $M_x(t)$, a and b are any two constants ,prove that

$i) M_{bx}(t) = M_x(bt)$

$ii) M_{\frac{x+a}{b}}(t) = e^{\frac{a}{b}t} M_x(\frac{t}{b})$

Q2:- Let

$$f(x) = \begin{cases} e^{-\lambda}\lambda^x \frac{1}{x!} & ,x = 0,1,2,... \\ 0 & ,o.w \end{cases}$$, find Var(x) by using M.g.f. ?

$Q3:-Let \quad X \sim Beta(a,b) \quad ,find \quad E(X)^2$?

Q4:- Let X ~ Discrete uniform (N) find M.g.f. of X ?

Q5:- Let X have the P.d.f.

$$f(x) = \begin{cases} 2(1-x) & ,0 \le x \le 1 \\ 0 & ,o.w \end{cases}$$ *find* $E(6x+3x^2)$?

$Q6:-$ *Suppose* $X \sim N \quad (\mu,\sigma^2)$ *Show that* $Var(x) = \sigma^2$

$Q7:-$ **Prove or disprove** $\sqrt{\alpha} = (\alpha - 1)$!

Best of luck

Lecturer
Lecturer Alaa H. Sabri

Head of department
Assist prof. Rafid H. Buti