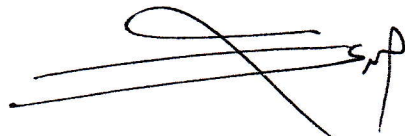



5	<p>a) Find length of arc to a curve in spherical coordinate x^i which is given by:</p> $x^1 = t, \quad x^2 = \sin^{-1}\left(\frac{1}{t}\right), \quad x^3 = 2\sqrt{t^2 - 1}, \quad 1 \leq t \leq 2.$
	<p>b) Show that a symmetric tensor of rank two has only $\frac{1}{2}n(n+1)$ different components in n-dimensional space.</p>
6	<p>a) Find the Gaussian and mean curvature for the following ruled surface:</p> $\underline{X}(s, v) = \underline{r}(s) + v \underline{b}(s), \quad v \in R$
	<p>b) Define the Christoffel's symbols of first and second kind and prove the following relations:</p> $(i) [ij, m] = g_{km} \begin{Bmatrix} k \\ i \quad j \end{Bmatrix}, \quad (ii) [ik, j] + [jk, i] = \frac{\partial g_{ij}}{\partial x^k}$

انتهت الأسئلة

مع دعواتنا لكم بالتوفيق والنجاح



أ.د/ حمدي نور الدين

Department of Mathematics		قسم الرياضيات
Faculty of Science		كلية العلوم
اختبار نهاية الفصل الدراسي الأول للعام الجامعي ٢٠٢٣/٢٠٢٤		
الزمن: ثلاث ساعات التاريخ: ٢٠٢٣ / ١ / ٤	درجة الاختبار: ٥٠ درجة الفرقة: الثالثة رياضيات	اسم المقرر: موضوعات مختارة في الرياضيات ١ رمز المقرر: ٣١٥ ر

أجب عن الأسئلة الآتية:-

السؤال الأول: أوجد قيمة كل من (١٠ درجات)

(i) $\Gamma\left(\frac{-5}{2}\right)$

(ii) $\beta\left(\frac{1}{6}, \frac{11}{6}\right)$

(iii) $P_2(x)$

(iv) $H_2(x)$

(v) $L^{-1}\left\{\frac{6s-4}{s^2-4s+20}\right\}$

السؤال الثاني: أوجد قيمة التكاملات الآتية (٩ درجات)

(i) $\int_0^\infty \sqrt{x} e^{-x^3} dx,$

(ii) $\int_0^{\frac{\pi}{4}} \sqrt{\sec 2x} dx,$

(iii) $\int x^4 J_1(x) dx$

السؤال الثالث: (١١ درجات)

(أ) أثبت أن $\Gamma(2n) = \frac{2^{2n-1}}{\sqrt{\pi}} \Gamma(n) \Gamma\left(n + \frac{1}{2}\right)$

(ب) أثبت أن P_2^1, P_3^1 متعامدان .

السؤال الرابع: (١٠ درجات)

(أ) أثبت أن $\int_0^a x^3 J_0(x) dx = 2a^2 J_0(a) + a(a^2 - 4) J_1(a)$

(ب) أثبت أن $T_5(x) = 16x^5 - 20x^3 + 5x$

السؤال الخامس: (١٠ درجات)



(أ) أوجد الثلاثة حدود الأولى في مفكوك الدالة $f(x) = x^3 - 3x^2 + 2x$ في صورة المتسلسلة

$\sum_{n=0}^\infty A_n H_n(x)$

(ب) أوجد حل المعادلة التفاضلية الآتية مع الشروط المذكورة وذلك باستخدام مؤثر لابلاس

$Y'' + 2Y' + 5Y = e^{-t} \sin t, \quad Y(0) = 1, \quad Y'(0) = 1$

انتهت الأسئلة مع تمنياتي بالتوفيق والنجاح د. السيد أبو طبل

	Assiut University Faculty of Science Mathematics Dept.	Final Exam 2023/2024 Databases Code: MC357	25/1/2024 Level: 3 Time: 2 hours	
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Answer the following questions:

(50 Marks)

Q1: Shade a, b, c, or d in the bubble sheet

(25 Marks)

1. Which language is used to manipulate databases in a relational database management system?

A	Java	B	SQL	C	C++	D	Python
---	------	---	-----	---	-----	---	--------

2. Which SQL command is used to retrieve data from a database?

A	SELECT	B	FETCH	C	GET	D	ACQUIRE
---	--------	---	-------	---	-----	---	---------

3. Which of the following is not a part of ACID properties?

A	Atomicity	B	Consistency	C	Isolation	D	Dependability
---	-----------	---	-------------	---	-----------	---	---------------

4. Which SQL clause is used to group the result set by one or more columns?

A	GROUP With	B	HAVING	C	GROUP BY	D	ORDER BY
---	------------	---	--------	---	----------	---	----------

5. Which SQL command is used to insert new records into a table?

A	ADD	B	APPEND	C	INSERT	D	ATTACH
---	-----	---	--------	---	--------	---	--------

6. Theis a general-purpose software system that facilitates the processes of defining, constructing, manipulating, and sharing databases among various users and applications.

A	Python	B	DBMS	C	Java	D	SQL
---	--------	---	------	---	------	---	-----

7. The characteristic that allows program-data independence and program-operation independence is called.....

A	data structure	B	data abstraction	C	data model	D	database
---	----------------	---	------------------	---	------------	---	----------

8.a database allows multiple users and programs to access the database simultaneously.

A	Sharing	B	Manipulating	C	Viewing	D	Securing
---	---------	---	--------------	---	---------	---	----------

9. The description of a database is called the database....., which is specified during database design.

A	design	B	abstraction	C	model	D	schema
---	--------	---	-------------	---	-------	---	--------

10.data models provide concepts that describe the details of how data is stored on the computer storage media, typically magnetic disks.

A	Conceptual	B	Logical	C	Physical	D	A and C
---	------------	---	---------	---	----------	---	---------

11. The goal of theschema architecture, is to separate the user applications from the physical database.

A	Two	B	Three	C	Four	D	Five
---	-----	---	-------	---	------	---	------

12. Which schema architecture defines the specific view of the database for a particular group of users?

A	External	B	Physical	C	Conceptual	D	Logical
---	----------	---	----------	---	------------	---	---------

13. The, is used to specify the internal schema.

A	SQL	B	VDL	C	DDL	D	SDL
---	-----	---	-----	---	-----	---	-----

14. Theschema is transformed from the high-level data model into the implementation data model.

A	conceptual	B	physical	C	external	D	logical
---	------------	---	----------	---	----------	---	---------

15. The DBMS provides a set of operations or a language called the for these purposes.

A	SDL	B	DDL	C	VDL	D	DML
---	-----	---	-----	---	-----	---	-----

16. What does a diamond shape represent in an ER diagram?

A	Entity	B	Attribute	C	Relationship	D	Key constraint
---	--------	---	-----------	---	--------------	---	----------------

17. What does a double rectangle represent in an ER diagram?

A	An attribute	B	A weak entity	C	A relationship	D	A key constraint
---	--------------	---	---------------	---	----------------	---	------------------

18. Which SQL clause is used to filter records based on specified criteria?

A	FROM	B	GROUP BY	C	ORDER BY	D	WHERE
---	------	---	----------	---	----------	---	-------

19. Which SQL command is used to delete a table from the database?..... TABLE

A	DELETE	B	REMOVE	C	DROP	D	TRUNCATE
---	--------	---	--------	---	------	---	----------

20. Theoperation selects certain columns from the table and discards the other columns.

A	PROJECT	B	SELECT	C	GROUP BY	D	FROM
---	---------	---	--------	---	----------	---	------

21. Which SQL command is used to add a new table to the database?

A	UPDATE	B	CREATE	C	INSERT	D	ALTER
---	--------	---	--------	---	--------	---	-------

22. Which SQL keyword is used to retrieve unique values from a column in a table?

A	UNIQUE	B	DIFFERENT	C	DISTINCT	D	UNIQUEVALUES
---	--------	---	-----------	---	----------	---	--------------

23. Which of the following is not a type of database model?

A	Hierarchical	B	Relational	C	Object-oriented	D	Graphical
---	--------------	---	------------	---	-----------------	---	-----------

24. Adependency is a constraint between two sets of attributes from the database.

A	functional	B	attributes	C	relational	D	None of these
---	------------	---	------------	---	------------	---	---------------

25. Which type of SQL command is used to add or drop columns in an existing table?

A	DDL	B	ALTER	C	DML	D	DCL
---	-----	---	-------	---	-----	---	-----

Q2: Shade T or F in the bubble sheet


(25 Marks)

26. A primary key uniquely identifies each record in a table.
27. Views in a database can be used to hide sensitive information from users.
28. SQL stands for Standard Query Language.
29. In a relational database, a foreign key establishes a link between two tables.
30. Denormalization is the process of organizing data into tables in a normalized way.
31. A database transaction ensures the atomicity, consistency, and isolation of database operations but not durability.
32. Indexes in a database improve query performance but slow down data modification operations.
33. Changes to the physical schema will affect the external schema.
34. External schema represents the physical implementation of the database.
35. Database normalization aims to reduce redundancy and dependency in data.
36. In an ER diagram, a relationship is always shown as a straight-line connecting entities.
37. A Boolean data type has the traditional values of 1 or 0.
38. The SQL command "ORDER BY" is used to arrange data in descending order only.
39. Triggers in a database are actions that automatically execute in response to certain events.
40. NoSQL databases primarily rely on the relational data model.
41. A database is a logically coherent collection of data with some inherent meaning.
42. Conceptual schema provides a high-level description of the entire database.
43. A query may cause some data to be read and some data to be written into the database.
44. Physical schema determines how data is presented to the end-users.
45. In an ER diagram, a double oval represents a multi-valued attribute.
46. A data model is a type of data abstraction that is used to provide this conceptual representation.
47. The SQL command "INSERT" is used to update existing records in a table.
48. Each entity has attributes—the particular properties that describe it.
49. A weak entity in an ER diagram always depends on another entity for its existence.
50. The basic concept that the ER model represents is an entity.

Best Wishes

Dr. Mohamed M. Darwish

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Department of Mathematics		قسم الرياضيات
Faculty of Science		كلية العلوم
الامتحان النهائي للفصل الدراسي الأول للعام الجامعي 2023 / 2024		
شعبة الرياضيات	المستوى الثالث	نظام الساعات المعتمدة
التاريخ : الأربعاء 24 / 1 / 2024 م	الدرجة الكلية : 50 درجة	اسم المقرر : نظرية الزمر
الزمن : ساعتان		رقم المقرر ورمزه : 321 ر

أولاً : أجب عن السؤال التالي : (20 درجة)

1-	(أ) صف عناصر $GL_2(\mathbb{R})$ من رتبة 2 التي على الصورة $\begin{bmatrix} a & b \\ c & 0 \end{bmatrix}$, حيث $b, c \neq 0$ وبين أنه يوجد عدد لانتهائي من هذه العناصر. (3 درجات)
	(ب) نفرض G زمرة و A زمرة جزئية من G . بين أن العنصر المحايد في A هو نفس العنصر المحايد في G . (3 درجات)
	(ج) أكتب جدول الزمرة \mathbb{Z}_5 ثم أوجد الزمر الجزئية الفعلية غير التافهة من \mathbb{Z}_5 . علل النتيجة التي حصلت عليها. (5 درجات)
	(د) نفرض G مجموعة كل الأعداد الحقيقية أكبر من 1. نعرف العملية $*$ على G كما يلي $x * y = xy - x - y + 2$ لكل $x, y \in G$. برهن على أن $(G, *)$ تكون زمرة. (5 درجات)
	(هـ) نفرض ϕ تشاكل زمري من الزمرة G إلى الزمر \bar{G} . إذا كانت K زمرة جزئية من \bar{G} فبين أن $\phi^{-1}(K)$ تكون زمرة جزئية من G . (4 درجات)

ثانياً : أجب عن سؤالين فقط من الأسئلة التالية. (15 درجة لكل سؤال)



2-	(أ) نفرض $\phi: G \rightarrow H$ تشاكل زمري بين G و H تكون إبدالية إذا وفقط إذا كان $\phi(G)$ إبدالية. بين أن $\phi(G)$ تكون إبدالية إذا وفقط إذا كان $\phi(G)$ إبدالية. (5 درجات)
	(ب) بين أن $\mathbb{Z}_4 \cong \langle i \rangle$. (5 درجات)
	(ج) نفرض H و K زمريتان جزئيتان من الزمرة الإبدالية G بحيث $HK = G$ و $H \cap K = \{e\}$. برهن على أن $G \cong H \times K$. (5 درجات)
3-	(أ) نفرض $\mu = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 5 & 2 & 4 & 3 & 1 & 6 \end{pmatrix}$. أوجد $ \mu $. (3 درجات)

19. Based on recursion-tree method, the solution of $T(n) = T(n/4) + T(n/2) + n^2$ is
 A $\omega(n^2)$ B $\Omega(n^2)$ C $\Theta(n^2)$ D $O(n^2)$
20. Which of the following represents a recursive algorithm's termination condition in a recursion tree?
 A Base case B Recursive step C Function call D Tail recursion
21. Solve sub-problems by calling recursively until solved.
 A Divide B Conquer C Combine D Divide and Conquer
22. $(n(n-1))/2 \in \dots$
 A $\omega(n^2)$ B $\Theta(n^2)$ C $\Omega(n^2)$ D $O(n^2)$
23. $3n^3 + 5n \log n = \dots$
 A $O(n \log n)$ B $\Omega(n^3)$ C $O(n^2)$ D $O(n^3)$
24. $T(n)$ = maximum time of algorithm on any input of size n .
 A Worst-case B Average-case C Best-case D None of these
25. $T(n) = \dots$ for all $n < n_0$, where n_0 is a suitable constant.
 A $O(1)$ B $\Theta(1)$ C $\Omega(1)$ D $\omega(1)$

Q2: Shade T or F in the bubble sheet

(25 Marks)

26. Solving recurrence relations helps in understanding how the running time of an algorithm scales with the input size.
27. Recurrence relations are equations that define a function in terms of its values at smaller inputs.
28. Binary Search works efficiently on both sorted and unsorted arrays.
29. Merge Sort is an example of an in-place sorting algorithm that requires extra space for sorting elements.
30. Insertion Sort performs efficiently on large datasets due to its linear time complexity, making it suitable for general-purpose sorting.
31. The lower-order terms and constants in **Big-O** notation significantly impact the comparison of algorithmic efficiencies for large input sizes.
32. When analyzing algorithms, the lower-order terms and constants in **Big-O** notation are disregarded as they become insignificant for large input sizes.
33. The divide and conquer approach is only useful for sorting algorithms and cannot be applied to other types of problems.
34. Recursion trees are only applicable to algorithms using iterative methods and cannot be used for recursive algorithms.
35. The Master Theorem is used for analyzing the time complexity of divide and conquer algorithms.
36. Bubble Sort is a stable sorting algorithm with a time complexity of $O(n \log n)$ in the worst-case scenario.
37. **Big-O** notation provides an exact measurement of the running time of an algorithm for a given input size.
38. An algorithm with a time complexity of $O(n^2)$ is generally considered more efficient than an algorithm with a time complexity of $O(n \log n)$.
39. The structure of a recursion tree directly represents the time complexity of an algorithm, with each level contributing to the overall time taken.
40. The merge sort algorithm has a worst-case time complexity of $O(n^2)$.
41. Binary search can only be applied to sorted arrays.
42. The complexity of the naive matrix multiplication algorithm is $O(n^3)$.
43. Θ -notation provides an asymptotic lower bound.
44. Ω -notation provides an asymptotic tight bound.
45. $2n^2 + 3n + 1 = 2n^2 + \Theta(n)$.
46. $2n = o(n^2)$, but $2n^2 \neq o(n^2)$.
47. $n^2/2 \neq \omega(n)$, but $n^2/2 = \omega(n^2)$.
48. $f(n)$ is asymptotically larger than $g(n)$ if $f(n) = o(g(n))$.
49. Analyzing a recursion tree helps in understanding the time complexity of a recursive algorithm.
50. The recurrence is well defined if there is at least one function that satisfies it, and ill-defined otherwise.

	Assiut University Faculty of Science Mathematics Dept.	Final Exam 2023/2024 Algorithm Code: MC353	14/1/2024 Level: 3 Time: 3 hours	
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Answer the following questions:

(50 Marks)

Q1: Shade a, b, c, or d in the bubble sheet

(25 Marks)

- What is the best time complexity of bubble sort?
A n^2 B n C $n \log n$ D $n^{0.5}$
- Which of the following time complexities indicates the most efficient algorithm?
A $O(n)$ B $O(n \log n)$ C $O(n^2)$ D $O(2^n)$
- Worst case of insertion sort algorithm is
A $\omega(n^2)$ B $O(n^2)$ C $\Omega(n^2)$ D $\Theta(n^2)$
- What does Big-O notation represent in algorithmic analysis?
A Exact running time B Average running time C Upper bound D Lower bound
- Which search algorithm iterates through all elements in a list or array to find a target value?
A Jump Search B Interpolation Search C Linear Search D Binary Search
- Which search algorithm is most suitable for a sorted array or list and uses a divide-and-conquer approach?
A Jump Search B Binary Search C Linear Search D Depth-First Search
- If an array is nearly sorted, which sorting algorithm would typically perform efficiently without significant rearrangements?
A Merge Sort B Insertion Sort C Selection Sort D Shell Sort
- Which sorting algorithm could be likened to organizing a deck of cards by repeatedly swapping adjacent cards if they are in the wrong order?
A Bubble Sort B Quick Sort C Merge Sort D Insertion Sort
- Which sorting algorithm has the worst-case time complexity of $O(n^2)$ but is advantageous for nearly sorted arrays?
A Quick Sort B Merge Sort C Insertion Sort D Bubble Sort
- If an algorithm has a time complexity of $O(n^2)$ and another has $O(n \log n)$, which algorithm is generally more efficient for large input sizes?
A $O(n^2)$ B Both are equally efficient C $O(n \log n)$ D It depends on the specific input
- Which sorting algorithm has an average-case time complexity of $O(n \log n)$ and works by dividing the array into partitions?
A Insertion Sort B Merge sort C Bubble Sort D Selection Sort
- Which algorithmic paradigm recursively reduces a problem into smaller subproblems and solves each independently, followed by combining solutions to solve the original problem?
A Divide and conquer B Recursion C Greedy algorithms D Backtracking
- Which sorting algorithm has the best average-case time complexity?
A Insertion Sort B Selection Sort C Bubble Sort D Merge sort
- It is true prior to the first iteration of the loop.
A Initialization B Maintenance C Termination D A and C
- An unordered list contains n distinct elements. The number of comparisons to find an element in this list that is neither maximum nor minimum is.....
A $\Theta(n \log n)$ B $\Theta(\log n)$ C $\Theta(n)$ D $\Theta(1)$
- For merging two sorted lists of sizes m and n into a sorted list of size $m+n$, we require comparisons of.....
A $O(m)$ B $O(n)$ C $O(m+n)$ D $O(\log m + \log n)$
- What is the additional space complexity of merge sort?
A $O(1)$ B $O(n)$ C $O(\log n)$ D $O(n \log n)$
- Which of the following stable sorting algorithm takes the least time when applied to an almost sorted array?
A Insertion Sort B Merge sort C Bubble Sort D Selection Sort

Department of Mathematics		قسم الرياضيات
Faculty of Science		كلية العلوم
الامتحان النهائي للفصل الدراسي الاول للعام الجامعي ٢٠٢٣ / ٢٠٢٤ طلاب المستوى الثالث والرابع (شعبة فيزياء- رياضيات)		
اسم المقرر ورسمه: ممتدات (٣١٩ ر)	الدرجة الكلية: ٥٠ درجة	التاريخ: ٢٠٢٤ / ١ / ٢٠ الزمن: ٣ ساعات

Answer five questions only of the following:

١٠ درجات لكل سؤال (٥ درجات لكل فقرة)

1	a)	If a vector has components \dot{x} , \dot{y} in rectangular Cartesian coordinates, thus prove that \dot{r} , $\dot{\theta}$ are components in polar coordinates. $\dot{\cdot} = \frac{d}{dt}$
	b)	Using the data in question (1-a) to show that they are $\ddot{r} - r \dot{\theta}^2$, $\ddot{\theta} + \left(\frac{2}{r}\right) \dot{r} \dot{\theta}$ components in polar co-ordinates.
2	a)	If the components of a contravariant tensor T are $T^{11}=1$, $T^{12}=1$, $T^{21}=-1$, $T^{22}=2$, $i, j = 1, 2$ Find the components $\overset{-ij}{T}$ of T in the $\overset{-i}{x}$ - system connected to the $\overset{-1}{x^i}$ - System via: $\overset{-1}{x} = (x^2)^2 \neq 0$, $\overset{-2}{x} = \ln \sqrt{x^1 x^2}$
	b)	Compute the values of the $\overset{-ij}{T}$ in (2-a) at the point which corresponds to $(x^1, x^2) = (1, 2)$
3	a)	If T_i be the component of a covariant vector. Show that $\left(\frac{\partial T_i}{\partial x^j} - \frac{\partial T_j}{\partial x^i}\right)$ are component of a skew-symmetric covariant tensor of rank two.
	b)	Show that the product of two tensors A_j^i and B_m^{kl} is a tensor of rank five.
4	a)	Show that the metric in spherical coordinates is given by: $ds^2 = dr^2 + r^2 d\theta^2 + r^2 \sin^2 \theta d\phi^2$
	b)	For the above metric in (a), Find the values of: (i) $[22,1]$ and $[13,3]$, (ii) $\begin{Bmatrix} 1 \\ 2 \end{Bmatrix}$ and $\begin{Bmatrix} 3 \\ 1 \end{Bmatrix}$

(ب) في حالة غاز يرتبط ضغطه مع حجمه ودرجه حرارته بالعلاقة : $P = \frac{RT}{V-b} - \frac{a}{V\sqrt{T}(V+b)}$ حيث a, b, R ثوابت أحسب المعاملات الترموديناميكية

$$\left(\frac{\partial P}{\partial V}\right)_T, \left(\frac{\partial P}{\partial T}\right)_V, \left(\frac{\partial V}{\partial T}\right)_P$$

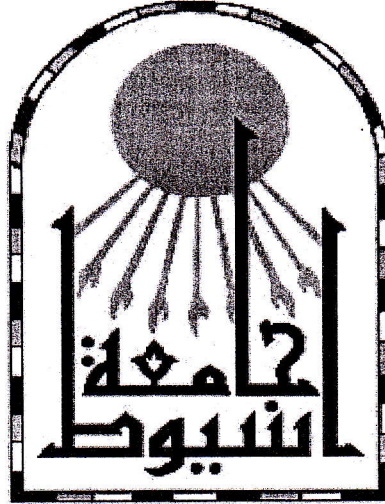
ثم تحقق هل dP تمثل تفاضلاً تاماً ، بمعنى أن هل الضغط P هو دالة حاله للغاز؟ (٤ درجات)

(ج) إذا علمت أن الطاقة الحرة (دالة هلمهولتز) لنظام تيرموديناميكي تعطى من العلاقة

$$F(V, T) = A + BT(1 - \ln T) - CT \ln V$$

حيث A, B, C مقادير ثابتة أوجد الطاقة الداخلية والانتالبي والسعة الحرارية عند ثبوت الحجم؟ (٤ درجات)

انتهت الأسئلة



د. / عصام ادفاوي محمد حامد- د. / اسراء جمال



مع أجمل أمنياتنا بالتوفيق والنجاح للجميع



المستوى: الثالث الفرقة: ثالثة علوم (رياضيات) الزمن: ثلاث ساعات الدرجة الكلية: 50 درجة

(درجات الامتحان: الدرجة الكلية 50 درجة موزعة على خمسة أسئلة بواقع 10 درجات عن كل سؤال - 5 درجات عن كل فقرة)

$$p = z_x, \quad q = z_y, \quad D_1 = \frac{\partial}{\partial x}, \quad D_2 = \frac{\partial}{\partial y} \quad \text{ملاحظة:-}$$

أجب عن مما يأتي:-

1- (أ) حل المعادلتين التفاضليتين الآتيتين:

$$\ddot{x} + \dot{y} = \cos t, \quad x - \dot{y} = 3t + 2 - \cos t \quad \text{إذا كانت } x(0) = 2, \quad \dot{x}(0) = 3, \quad y(0) = 0.$$

ب) بالتحويل للصورة القياسية - أوجد الحل العام للمعادلة التفاضلية $x^2 y'' - 2xy' + (x^2 + 2)y = x^3 \sec x, \quad (x > 0)$.2- (أ) حقق أن المعادلة التفاضلية $2yz \, dx + xz \, dy - xy(1+z) \, dz = 0$ قابلة للتكامل، ثم أوجد الحل العام لها.

ب) باستخدام تحليل المؤثر التفاضلي - أوجد الحل العام للمعادلة التفاضلية:

$$(x+2)y'' - (2x+5)y' + 2y = 2(x+2)^2 e^{2x}, \quad (x \neq -2)$$

3- (أ) بطريقة فروبنينوس أوجد الحل العام للمعادلة التفاضلية $4xy'' + 2y' + y = 0$ وذلك بالقرب من نقطة الأصل.ب) استخدم طريقة التكامل في إيجاد الحل العام للمعادلة التفاضلية $(D_1^2 + D_1 D_2 - 2D_2^2)z = (y+3)e^x$.4- (أ) باستخدام طريقة العوامل غير المعينة - أوجد الحل العام للمعادلة التفاضلية $(D_1^3 + D_1^2 D_2 - D_1 D_2^2 - D_2^3)z = e^x \sin 2y$.ب) أوجد الحل العام للمعادلة التفاضلية $(D_1^2 - 3D_1 D_2 + 2D_2^2)z = \cos(x-2y) + e^{2x+y}$.5- (أ) أوجد الحل العام للمعادلة التفاضلية $yp + xq + x + y = 0$ ثم أوجد الحل الخاص الذي يمر خلال المنحنى:

$$e^{x+y} = 2x(x+y), \quad z = 0.$$

ب) بطريقة فصل المتغيرات - أوجد حلا لمعادلة لابلاس $z_{xx} + z_{yy} = 0$ بحيث تحقق الشروط:

$$(i) \quad z = 0 \quad \text{عندما } y \rightarrow \infty \quad \text{أو } x = 0 \quad \text{أو } x = \pi.$$

$$(ii) \quad z = \pi x - x^2 \quad \text{عندما } y = 0 \quad \text{لجميع قيم } x \quad \text{في الفترة } (0, \pi).$$

() يمكن تعرفه دالة التجزئة في هذه الحالة بالعلاقة الرياضية $z = \sum_i g_i e^{-\beta \epsilon_i}$

(٤) يتناسب الضغط والحجم للنظام الثيرموديناميكي تناسباً عكسياً

(٥) في توزيع فيرمي ديراك لا توجد قيود على عدد الجسيمات التي تشغل الحالة الكميه الواحدة

(٦) دالة التجزئة لنظام مكون من ٣ مستويات للطاقة بمقدار $0, \epsilon, -\epsilon$ هي $Z = 1 + e^{\beta \epsilon} + e^{-\beta \epsilon}$

(ب) اختر الإجابة الصحيحة في العبارات التالية: (درجة لكل فقرة)

س ١ :- إذا علمت أن الانتروبي لنظام ما مكون من N من الجسيمات هو $S = \frac{U}{T} + Nk[\ln Z - \ln N + 1]$ حيث U هي الطاقة الداخلية و Z دالة التجزئة و k ثابت بولتزمان و T درجة الحرارة تكون الطاقة الحرة لنفس النظام مساوية

$$F = NKT[\ln Z + \ln N + 1] \text{ (B)}$$

$$F = -NkT[\ln Z - \ln N - 1] \text{ (A)}$$

$$F = NkT[\ln Z + \ln N + 1] \text{ (D)}$$

$$F = -NkT[\ln Z - \ln N + 1] \text{ (C)}$$

س ٢ :- العلاقة التي تربط بين الانتروبي ودالة التجزئة والطاقة هي

$$S = k[N \ln Z - \beta E] \text{ (B)}$$

$$S = k[N \ln Z + \beta E] \text{ (A)}$$

$$S = k[\ln Z + \beta E] \text{ (D)}$$

$$S = k[N \ln E] \text{ (C)}$$

س ٣ :- أي من العلاقات التالية ليس من معادلات ماكسويل

$$(\partial T / \partial p) = -(\partial V / \partial S) \text{ (B)}$$

$$(\partial V / \partial T) = -(\partial S / \partial p) \text{ (A)}$$

$$(\partial T / \partial V) = -(\partial p / \partial S) \text{ (D)}$$

$$(\partial p / \partial T) = (\partial S / \partial V) \text{ (C)}$$

س ٤ :- إذا كانت السعة الحرارية لغاز ما تعطى من $C_v = \alpha T + \beta T^3$ يكون الانتروبي لحجم ثابت من هذا الغاز مساوياً

$$\alpha T + \beta T^3 \text{ (B)}$$

$$\alpha T + \frac{1}{3} \beta T^3 \text{ (A)}$$

$$\frac{1}{2} \alpha T + \frac{1}{4} \beta T^3 \text{ (D)}$$

$$\frac{1}{2} \alpha T + \frac{1}{3} \beta T^3 \text{ (C)}$$

س ٥ :- لا يمكن تطبيق إحصائيات ماكسويل بولتزمان على

(D) جميع ما سبق

(C) الفوتونات

(B) الجزيئات

(A) الذرات

س ٦ :- إحصائيات فيرمي ديراك Fermi-Dirac مخصصة لـ

(D) الجسيمات الغير متمايزة

(C) الغازات

(B) الجزيئات

(A) الجسيمات المتمايزة

١٣ درجة

السؤال الرابع :-

(أ) من تعريف الوزن الاحصائي $W = \frac{N!}{\prod_k N_k}$ وباستخدام تقريب ستيرلنج أثبت أن الانتروبي يعطى من العلاقة

$$S = k \left[N \ln N - \sum_k N_k \ln N_k \right] \text{ حيث } N \text{ هي عدد الجسيمات ، } k \text{ هو ثابت بولتزمان. (٥ درجات)}$$

أنظر الصفحة التالية

س٤:- مؤثر الهاملتون H في ميكانيكا الكم هو

$$-\frac{\hbar^2}{2m} \frac{\partial^2}{\partial x^2} + V(x) \quad (A) \quad -\frac{\hbar^2}{2m} \frac{\partial^2}{\partial x^2} - V(x) \quad (B) \quad -\frac{\hbar^2}{2m^2} \frac{\partial^2}{\partial x^2} + V(x) \quad (C) \quad -\frac{\hbar^2}{2m^2} \frac{\partial^2}{\partial x^2} - V(x) \quad (D)$$

س٥:- الصيغة الرياضية لمبدأ عدم التحديد (قاعدة الشك) لهايزنبرج

$$\sqrt{\langle (\Delta x)^2 \rangle} \sqrt{\langle (\Delta p)^2 \rangle} \geq \frac{1}{2} \hbar \quad (B) \quad \sqrt{\langle (\Delta x)^2 \rangle} \sqrt{\langle (\Delta p)^2 \rangle} < \frac{1}{2} \hbar \quad (A)$$

$$\sqrt{\langle (\Delta x)^2 \rangle} \sqrt{\langle (\Delta p)^2 \rangle} \leq \frac{1}{2} \hbar \quad (D) \quad \sqrt{\langle (\Delta x)^2 \rangle} \sqrt{\langle (\Delta p)^2 \rangle} > \frac{1}{2} \hbar \quad (C)$$

س٦:- يتحرك جسيم كتلته m وطاقته الكلية E في صندوق على شكل مكعب طول حرفه a إذا كان الجسيم حراً (Free particle) أي الجهد داخل الصندوق (V=0, 0<x<a, 0<y<a, 0<z<a) فإن مستويات الطاقة تعطي في الصورة:

$$E_{n_1, n_2, n_3} = \frac{h^2}{8ma^2} (n_1^2 - n_2^2 - n_3^2) \quad (B) \quad E_{n_1, n_2, n_3} = \frac{h^2}{8ma^2} (n_1^2 - n_2^2 + n_3^2) \quad (A)$$

$$E_{n_1, n_2, n_3} = \frac{h^2}{8ma^2} (n_1^2 + n_2^2 + n_3^2) \quad (D) \quad E_{n_1, n_2, n_3} = \frac{h^2}{8ma^2} (n_1 + n_2 + n_3) \quad (C)$$

السؤال الثاني:-

١٣ درجة

(سبع درجات)

(أ) للدالة الموجية $\psi(x) = C e^{-8x^2 - 2ix}$ أوجد ما يلي:

(A) قيمة الثابت C. (B) كثافة الاحتمال. (C) شدة التيار الاحتمال. (D) مقدار عدم التحديد في الموضع وفي كمية الحركة.

(ست درجات)

(ب) يتحرك جسيم كتلته m وطاقته E من جهة اليسار نحو الجهد:

$$V = V_0 \quad x < -a; \quad V = 0 \quad -a < x < +a; \quad V = V_0 \quad x > +a; \quad E < V_0$$

ويتغير فجأة من الصفر إلى V_0 عند $x = -a, x = +a$. فأوجد المعادلة التي تعين مستويات طاقة الجسيم المسموح بها حتى يمكن للجسيم أن يتحرك في هذا الجهد تبعا لنظرية الميكانيكا الموجية.

الجزء الثاني: الميكانيكا الإحصائية

السؤال الثالث:-

١٢ درجة

(أ) ضع علامة (✓) امام الاجابة الصحيحة وعلامة (x) امام الاجابة الخاطئة: (درجة لكل فقرة)


(١) في إحصائيات بوز-آينشتاين ، يمكن أن يشغل أكثر من جسيم حالة طاقة واحدة. ()

(٢) المجموعة الإحصائية التي يتم بها تثبيت إجمالي الطاقة وعدد ونوع الجسيمات في النظام على قيم معينة ؛ ويمكن اعتبارها خزانا حراريا كبيرا معزولا بعناية عن الأشياء المحيطة بحيث تكون درجة الحرارة وبالتالي الطاقة

الإجمالية ثابتة تقريباً تسمى ب Micro-canonical ensemble ()

(٣) إذا كانت درجة الانحلال لنظام ثيرموديناميكي هي g_i ويتبع توزيع ماكسويل-بولتزمان على الصورة $N_i = \frac{g_i}{e^{\alpha + \beta \epsilon_i}}$

أنظر الصفحة التالية

Department of Mathematics		قسم الرياضيات
Faculty of science		كلية العلوم
الاختبار النهائي لقرر الأسس الرياضية لميكانيكا الكم والميكانيكا الإحصائية (١)		
الفرقة : الثالثة (شعبة رياضيات) كلية العلوم	الفصل الدراسي الأول ٢٠٢٣/٢٠٢٤ م	الدرجة: ٥٠
كود المقرر: M331	الثلاثاء ٢ يناير ٢٠٢٤ م	زمن الاختبار: ساعتان (من ٩-١١ صباحاً)

اسم الطالب (ة): رقم الجلوس:

الجزء الأول: ميكانيكا الكم

السؤال الأول: -

١٢ درجة

- (أ) ضع علامة (✓) امام الاجابة الصحيحة وعلامة (x) امام الاجابة الخاطئة: (درجة لكل فقرة)
- (١) يفسر علم الضوء الهندسي بعض الظواهر مثل الانعكاس والانكسار. ()
- (٢) الذي فسر لغز اشعاع الجسم الأسود هو العالم ماكس بلانك. ()
- (٣) من علاقات دي برولي: $E = h\omega$ ()
- (٤) معادلة شرودنجر الموجية المعتمدة على الزمن هي: $\nabla^2 \Psi + \left(\frac{2mV}{\hbar^2} \Psi - \frac{2m}{i\hbar} \frac{\partial \Psi}{\partial t}\right) = 0$ ()
- (٥) الدوال ψ_m, ψ_n هي دوال موجية متعامدة إذا كان $\int_{-\infty}^{\infty} \psi_m^* \psi_n dx = 0$ ()
- (٦) في الميكانيكا الموجية إذا كانت $E > V_0$ فإن الجسم سيرتد لأن سرعته مقدار تخيلي. ()

(ب) اختر الإجابة الصحيحة في العبارات التالية: (درجة لكل فقرة)

س ١ :- معادلة الحركة الكلاسيكية للجسيم هي:

$$(A) (\nabla S)^2 = \frac{1}{u} \left(\frac{\partial S}{\partial t}\right)^2 \quad (B) \nabla^2 S = \frac{1}{u^2} \left(\frac{\partial S}{\partial t}\right)^2 \quad (C) \nabla^2 S = \frac{1}{u^2} \frac{\partial^2 S}{\partial t^2} \quad (D) (\nabla S)^2 = \frac{1}{u^2} \left(\frac{\partial S}{\partial t}\right)^2$$

س ٢ :- قاعدة ويلسون-سومرفلد تحقق العلاقة الآتية:

$$(A) \oint p_\alpha dq_\alpha = n_\alpha h \quad (B) \oint p_\alpha dq_\alpha = 2n_\alpha h \quad (C) \oint p_\alpha dq_\alpha = n_\alpha \hbar \quad (D) \oint q_\alpha dp_\alpha = n_\alpha h$$

س ٣ :- الدالة التي تمثل دالة موجية فيما يلي هي:

$$(A) \psi(x) = \tan x, 0 \leq x \leq \pi \quad (B) \psi(x) = \frac{1}{x^2-1}, 0 \leq x \leq 2 \quad (C) \psi(x) = e^{-x^2}, 0 < x < \infty \quad (D) \psi(x) = e^{|x|}, -\infty < x < \infty$$

Notes:

- Cheating or Trying to Cheat may disqualify you from the course.

(50 Points)

MCQ Questions, Please Select the Correct Answer:

Q1) C# is considered _____					
a. High level language	b. Low level Language	c. Scripting Language	d. Framework	e. a,c	f. None

Q2) .NET Core is considered _____					
a. High level language	b. Low level Language	c. Scripting Language	d. Framework	e. a,c	f. None

Q3) In MAUI, Apps can have four execution states. How many of the four states indicate that the app is not in memory					
a. 1	b. 2	c. 3	d. 4	e. 5	f. 0

Q4) Client program can _____ (Choose all that apply)					
a. Receive Requests	b. Receive Responses	c. Send Requests	d. Generate Response	e. b,c	f. a,d

Q5) Server program can _____ (Choose all that apply)					
a. Receive Requests	b. Receive Responses	c. Send Requests	d. Generate Response	e. b,c	f. a,d

Q6) C# does not support multiple inheritance					
a. True	b. False				

Q7) C# Program entry point is _____					
a. Main method	b. Private method	c. Main Namespace	d. Main class	e. a,b	f. None

Q8) Razor Pages is part of _____					
a. MAUI	b. Web Development	c. Mobile Development	d. Desktop App	e. a, d only	f. None

Q9) Razor Pages are written in files with extension?					
a. .cs	b. .cshtml	c. .html	d. .css	e. .js	f. None

Q10) Which of the following are valid methods in web development using Razor Pages?					
a. OnGet	b. OnCreate	c. OnEdit	d. OnUpdate	e. a,b	f. None

Q11) What is the status code returned from HTTP request in case of OK response?					
a. 307	b. 200	c. 400	d. 302	e. 500	f. 401

Q12) Which of the following Git commands allows you to get code updates to Github?					
a. git get	b. git push	c. git pull	d. git branch	e. a, b only	f. a, c only.

Q13) Which of the following platforms are supported by MAUI for application development					
a. Android	b. MacOS	c. Web	d. Smart watches	e. a, b only	f. None

Q14) In C#, Methods are considered					
a. Class members	b. access modifier	c. entry point	d. namespace	e. a, b only	f. None

Q15) Which of the following can be a class name based on best practices and naming conventions?					
a. int	b. car	c. carType	d. BMW	e. CAR	f. Car

Q16) What is the output of <code>Console.WriteLine(\$"{{{number}}}");</code> given that number is equal to 12					
a. 12	b. {12}	c. {{12}}	d. {12}	e. error	f. c,d

Q17) <code>int.Parse("12");</code> statement should return _____					
a. Error	b. Integer	c. Double	d. String	e. Unsigned Integer	f. None

Q18) OOP Concepts includes					
a. Classes	b. Inheritance	c. Encapsulation	d. Polymorphism	e. a,b,c,d	f. a, c, d

Q19) Which of the following is considered Specialized Methods in C#?					
a. Constructor	b. ToString	c. Static	d. Protected	e. a,b	f. None

Q20) The can only be calculated or initialized at the time of instantiation					
a. True	b. False				

Q21) In Web development, HSTS mode					
a. Enforces all requests to use HTTPS	b. Enforces all requests to use HTTP	c. uses MVC	d. needs setting	e. a,b	f. None

Q22) To write an interface in C#, you use _____ keyword					
a. class	b. iface	c. namespace	d. static	e. interface	f. None

Q23) o enable Razor pages in your .NET web application, which of the following methods is invoked in Program.cs?					
a. <code>app.UseStaticFiles();</code>	b. <code>app.UseDefaultFiles();</code>	c. <code>app.Services.AddRazorPages();</code>			
d. <code>builder.MapRazorPages();</code>	e. Program.cs	f. <code>builder.Services.AddRazorPages();</code>			

Q24) Common Type system in C# includes					
a. Enumeration	b. Delegates	c. Interfaces	d. a, b, c	e. a, c	f. None

Q25) <code>var totalPrice = subtotal + salesTax;</code> is a correct C# Expression?					
a. True	b. False				

مع تمنياتي لكم بالتوفيق والنجاح
د. أحمد حسني

Notes:

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(50 Points)

MCQ Questions, Please Select the Correct Answer:

Q1) In this C line: <code>int main(int argc, char *argv[])</code> , what is the value type of <code>argv[1]</code> ?					
a. Character	b. String	c. Array of Characters	d. Pointer	e. All of the above	f. b, c, d only
Q2) What is the purpose of the following command: <code>nano cpu.c</code>					
a. Compile a <code>cpu.c</code> file	b. Compile a <code>cpu</code> file	c. Run C file	d. Edit or open <code>cpu.c</code>	e. None	
Q3) Which system call returns the process identifier for the process					
a. <code>getpid()</code>	b. <code>fork()</code>	c. <code>exec()</code>	d. <code>getppid()</code>	e. a, d only	f. None
Q4) The family of system calls allows a terminate the process					
a. <code>return</code>	b. <code>kill()</code>	c. <code>fork()</code>	d. <code>wait()</code>	e. <code>exec()</code>	f. None
Q5) Which system call returns the process identifier for the parent					
a. Ready	b. Running	c. Blocked	d. Wait	e. a, b, c only	f. b, c, d only
Q6) Which of the following is a Scheduling algorithm?					
a. Round Robin	b. Fastest Job First	c. FIFO	d. Response Time	e. a, b only	f. a, c only.
Q7) Which behavior of the following is used by a non-preemptive scheduler?					
a. Stops and run another job when arrives	b. Keep the running job regardless the coming one	c. Apply the scheduler policy on memory	d. Apply the scheduler policy on different CPUs	e. a, b only	f. c, d only
Q8) Memory abstraction for a process consists of					
a. Stack	b. Heap	c. Program Code	d. Queue	e. a, b, c only	f. a, b only
Q9) The OS must save and restore the base and bounds values. Where does the OS save them?					
a. Process List	b. Data Structure	c. OS Heap	d. OS Stack	e. PCB	f. None
Q10) Virtualization means:					
a. Manage Resources	b. Sharing Resource	c. Apply concurrency	d. Running Multiple Programs	e. a, d only	f. a, c, d
Q11) <code>x = x + 3</code> ; How many execution instructions translated in this line					
a. 1	b. 2	c. 3	d. 4	e. 5	f. 6
Q12) In Address Space Abstraction, the virtual memory of the process starts from address _____					
a. 0	b. base register	c. bound register	d. base + bounds	e. None	

Q13) Turnaround time is scheduling metric that:

a. $T_{arrival} - T_{completion}$	b. $T_{completion} - T_{firstrun}$	c. The lower it is, the faster the job will start
d. $T_{completion} - T_{arrival}$	e. $T_{firstrun} - T_{arrival}$	f. c, d

Q14) For memory virtualization, OS must take action to implement base-bound approach when

a. Start running	b. Process terminated	c. Context switching	d. a, b, c	e. a, c	f. None
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Q15) List of bases that OS can assign for each new process is stored in a data structure called

a. Free list	b. offset	c. Stack	d. PCB	e. b or c	f. None
--------------	-----------	----------	--------	-----------	---------

Q16) Process A needs 5 seconds on CPU then 2 seconds on I/O. Process B needs 7 seconds on CPU only. A and B arrives just together in this order. Using FIFO, Which process will finish first?

a. A	b. B	c. They will finish together if we have 2 CPUs	d. a, c	e. Missing info	f. OS decides
------	------	--	---------	-----------------	---------------

Q17) Indeterministic Program means

a. Program has different output with each run	b. Program runs in parallel	c. It is not clear when the program run	d. Program that has a child and main process	e. a, d only	f. b, c only
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Q18) Some data structures are used to track relevant process information:

a. Tree	b. Register Context	c. Processor List	d. Struct	e. b, c	f. a, b
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Q19) Considering a RR scheduling with 1 second time slice. Three jobs A, B, C are being scheduled to execute. A arrives first, B arrives 1 seconds after A, C arrives 2 seconds after A. A needs 3 seconds to complete, B needs 2 seconds to complete, and C needs 4 seconds to complete. What is the order of job completion?

a. A, B, C	b. A, C, B	c. B, A, C	d. B, C, A	e. C, A, B	f. C, B, A
------------	------------	------------	------------	------------	------------

Q20) Given the previous example in Q19, what is the average turnaround time?

a. 9	b. 4	c. 1	d. 0.3	e. 5.6	f. None
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Q21) Given the previous example in Q19, what is the average response time?

a. 9	b. 4	c. 1	d. 0.3	e. 3.5	f. None
------	------	------	--------	--------	---------

Q22) Considering a SJF scheduling algorithm. Three jobs A, B, C are being scheduled to execute. All arrives at the same time. A needs 2 seconds to complete, B needs 3 seconds to complete, and C needs 4 seconds to complete. What is the order of job completion?

a. A, B, C	b. A, C, B	c. B, A, C	d. B, C, A	e. C, A, B	f. C, B, A
------------	------------	------------	------------	------------	------------

Q23) Given the previous example in Q22, what is the average response time?

a. 1	b. 1.66	c. 2.5	d. 2.33	e. 4.66	f. None
------	---------	--------	---------	---------	---------

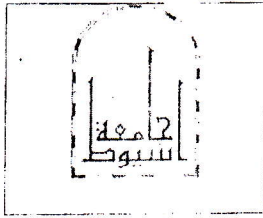
Q24) Considering a PSJF scheduling algorithm. Three jobs A, B, C are being scheduled to execute. A arrives first and needs 10 seconds to complete, 2 seconds later B arrives and needs 2 seconds to complete. Then C arrives after B with 2 seconds and needs 7 seconds to complete, what is the order of job completion?

a. A, B, C	b. A, C, B	c. B, A, C	d. B, C, A	e. C, A, B	f. C, B, A
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Q25) Given the previous example in Q24, what is the average response time?

a. 1	b. 1.66	c. 0	d. 5.33	e. 3.66	f. None
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مع تمنياتي لكم بالتوفيق والنجاح
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كلية العلوم - قسم الرياضيات
امتحان نهائي الفصل الدراسي الاول
للعام الجامعي ٢٠٢٣/٢٠٢٤

المقرر: تحليل عددي (٣٢٣)
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الزمن: ثلاث ساعات

Answer the following questions :- (10 marks for every question)

1-a) If $f(x)$, $f'(x)$, $f''(x)$ are continuous and $f(r) = 0$, $f'(r) \neq 0$ and the initial value x_0 is the near neighborhood of r . Prove that the Newton's method is quadratically converges to r and $e_{n+1} = \frac{1}{2} \left(\frac{f''(r_n)}{f'(x_n)} \right) e_n^2$ where τ_n between r and x_n and $e_n = x_n - r$.

1-b) Verify that when Newton's method is used to compute $\sqrt{40}$ (By solving the equation : $f(x) = x^2 - 40$). The sequence of iterates is defined by : $x_{n+1} = (x_n + \frac{40}{x_n})/2$, and show that it's quadratically converges.

2-a) If the function $g \in C[a, b]$ and $g(x) \in [a, b] \forall x \in [a, b]$ and $g'(x)$ exist with $|g'(x)| \leq k < 1 \forall x \in [a, b]$ and r is the solution of the equation $x = g(x)$. Prove that the sequence defined by $x_n = g(x_{n-1})$, $n \geq 1$ will converges to the unique fixed point r and also $|x_n - r| \leq k^n |x_0 - r|$.

2-b) Solve the following equation $f(x) = x^2 - 2x - 3 = 0$, by using the fixed point iteration $x = g(x) = \sqrt{2x+3}$, $x_0 = 4$. [NOTE: using three iteration].

3-a) Derive Lagrange interpolation formula of degree n and write the error of the method.

3-b) For the given function $f(x) = \cos \pi x$ let $x_0 = -1$, $x_1 = 0$, $x_2 = 1$ construct the suitable interpolation polynomial $p(x)$ and find $p(0.5)$ and $p'(0.5)$.

4) Derive the formula of the Newton's interpolatory divided difference method and use this formula to obtain a polynomial of least degree that fits the values shown:

x	0	1	2	4	6
$f(x)$	1	9	23	93	259

And find $f(1.5)$, $f''(1.5)$.


5-a) Derive Trapezoidal rule in the following formula :

$$\int_{x_0}^{x_1} f(x) dx \approx \frac{h}{2} [f(x_0) + f(x_1)] - \frac{h^3}{12} f''(\delta) \text{ where } h = x_1 - x_0 \text{ and } x_0 < \delta < x_1.$$

5-b) Solve the following integral using simpson's method of order two, and find the error using the error formula $\int_0^0.6 \frac{dx}{1+x^2}$, $h = 0.1$

GOOD LUCK

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ملاحظة: يتم طمس (تسويد) الإجابة المختارة باستخدام القلم الجاف فقط في ورقة البابل شيت

Answer all the following questions:

- 1- In EXCEL, are Values to be operated on
A) Operands B) Formula C) Operators D) Boolean value
- 2-Which menu item contains procedures to compute variables in SPSS?
A) Analyze menu B) Data menu C) Graph menu D) Transform menu
- 3- In SPSS, the window where the results of your analysis appear?
A) Data view B) Data editor C) Output viewer D) Variable view
- 4-What are the two main windows in SPSS?
A) Variable view and Output viewer B) Data editor and Output viewer
C) Data view and Variable view D) Data view and Output view
- 5-Which menu would you select to run descriptive statistical in SPSS?
A) Analyze menu B) Graph menu C) Data menu D) Transform menu
- 6-In SPSS, rows represent variables and columns represent characteristics of variables in
A) Output Viewer B) Variable view C) Data editor D) Data view
- 7- Which of the following is used for creating and defining various characteristics of variables in SPSS?
A) Variable viewer B) Output viewer C) Data editor D) Data view
- 8- In EXCEL, is number of decimal places stored in the computer.
A) Column B) row C) Precision D) cell
- 9- In EXCEL, You can enter which types of data into worksheet cells?
A) Labels, values, and formulas B) Labels and values but not formulas
C) Values and formulas but not labels D) Just values
- 10- Which function in Excel checks whether a condition is true or not ?
A)SUM B)COUNT C)IF D)AVERAGE
- 11- appear at the bottom of the Excel window.
A) Title bar B) Formula bar C) Worksheet tabs D) Row number
- 12- In EXCEL, The *second argument* and/or *third argument* of an IF statement can be another IF statement, we called this
A) IF function B) COUNTIF function C) Document IF D) NESTED IF
- 13- To change precision of B2 which contain 336.85 to 336.9, we use
A)=SUM(B2: 2) B)=ROUND(B2;1) C) =ROUND(B2;0) D)=COUNT(B2: 2)
- 14- Excel is a
A) Graphic program B) Word processor C) A spreadsheets D) Access processor
- 15- Descriptive and frequencies command used in.
A) Tables B) charts C) windows D)SPSS

See behind page,,,,,,,,,,,,,

- 16- In SPSS, Data can be entered in the _____ spreadsheet.
 A) Variable view B) data view C) Both A & B D) none of these
- 17- In SPSS, Most output display in tables can be modified by _____ clicking on the table.
 A) Single B) double C) triple D) none of these
- 18- Which command provides an advanced facility for table editing.
 A) Pivot table editor B) table editor C) A & B D) none of these
- 19- How many type of spreadsheet in SPSS.
 A) Two. B) Three. C) four. D) five.
- 20- In SPSS, The variables name must begin with a.
 A) number B) space C) Ampersands(&) D) letter
- 21- In EXCEL, which menu would you select to run descriptive statistical
 A) View menu B) Page layout menu C) Data menu D) Insert menu
- 22- In EXCEL, The Greater Than sign (>) is an example of _____ operator.
 A) Arithmetic B) Logical C) Conditional D) Normal
- 23- What happens when dollar signs (\$) are entered in a cell address (\$B\$2)
 A) An absolute cell address is created B) The sheet tab is changed
 C) Cell address will change when it is copied to another cell D) Font is changed
- 24- What does COUNTA() function do
 A) Counts cells having alphabets B) Counts empty cells
 C) Counts non-empty cells D) Count all cells
- 25- _____ are Operations to be performed
 A) Cell B) Operands C) Operators D) Formula
- 26- Which of the following formulas will Excel Not be able to calculate?
 A) =SUM(A1:A5)*.5 B) =SUM(A1:A5)/(10+10) C) SUM(A1:A5)-10 D) =A1=4
- 27- In EXCEL, Except for the _____ function, a formula with a logical function shows the word "TRUE" or "FALSE" as a result
 A) IF B) AND C) OR D) NOT
- 28- In EXCEL, _____ is a sequence of values, cell references and operators that produce a new value.
 A) Cell B) Formula C) Slides D) Box name bar
- 29- An Excel file is generally called a / an :
 A) Spreadsheet B) Worksheet C) Workbook
- 30- In EXCEL, In _____ a formula are automatically adjusted "relatively" when you copy the formula into another cell.
 A) Absolute Addressing B) Relative Addressing
 C) Mixed Addressing D) another answer
- 31- In EXCEL, _____ counts the number of values that meet a specified criteria:
 A) AND function B) SUMIF function C) COUNTIF function D) IF function
- 32- Which function in Excel tells how many numeric entries are there?
 A) NUM B) COUNT C) SUM D) ROUND
- 33- In EXCEL, What will be the result if you type =A1=B1 in cell C1?
 A) Yes or No B) True or False C) Value of A1 D) Value of B1
- 34- In the Data View in the SPSS, each column represents what?
 A) A case. B) A data point. C) A missing value. D) A variable.
- 35- The "SPSS" is a package of programs for.
 A) Analyzing B) manipulation C) presenting data D) all of these

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36- Which of the following is true about the names of variables in SPSS?

- A) They cannot contain spaces. B) They cannot begin with a numeral.
C) They cannot contain any special characters. D) All of these choices are true.

37- In SPSS, Value labels are necessary for which type(s) of variables.

- A) Nominal variables. B) Ordinal variables. C) All types D) Scale variables.

38- SPSS base provides method for.

- A) Data description B) Linear regression C) Simple inference D) all of these

39- SPSS stands for.

- A) Statistical package for the social sciences.
B) Standard package for the social sciences
C) A & B D) none of these

40- In SPSS, Ampersands (&) and spaces used as variables name.

- A) Can be B) cannot be C) none of these D) Both A & B

41- In EXCEL, The OR function Cannot write in the form

- A) OR(E4:E6>=20) B) OR(E4>=320, E5>=320, E6>=320)
C) OR(E4=320, E5<>320, E6=320) D) OR(E4=E6, E5=320, E6=E4)

42- In EXCEL, when you copy a formula

- A) Excel erases the original copy of the formula
B) Excel edits cell references in the newly copied formula
C) Excel adjusts absolute cell references
D) Excel edits cell references in the previously copied formula

43- Excel displays the #REF! error when

- A) a formula has the wrong type of argument.
B) Excel does not recognize text in a formula.
C) a formula refers to a cell that is not valid.
D) Excel Error Value that Numeric value too wide to display

44- In EXCEL, NESTEDIF function up to levels of nesting!

- A) 45 B) 64 C) 55 D) 54

45- In EXCEL, Which formula is true

- A) =COUNTIF(C5:C8;D5:D8;">6") B) =COUNTIF(C5:D8;">6")
C) =COUNTIF(C5:D8; >6) D) =COUNTIF(C5:D8; true)

46- In EXCEL, Zero round value to

- A) Specified number of decimal places B) tens, hundred, etc
C) a whole number D) another answer

47- In EXCEL, Positive num_digits round value to

- A) Specified number of decimal places B) tens, hundred, etc
C) a whole number D) another answer

48- In EXCEL, AVERAGE function is blank cells

- A) Not ignoring and replaced by 1 B) Not ignoring and replaced by 0.
C) Not ignoring and replaced by the value of the above cell. D) Ignoring

49- In EXCEL, The ROUND function used to

- A) Calculate the sum of values B) change the precision of value
C) Count the values in cells D) none of them

50- In EXCEL, The SUMIF Function is in the form

- A) =SUMIF(range; criteria; sum-range) B) =SUMIF(sum-range; criteria; range)
C) =SUMIF(range; criteria) D) =SUMIF(sum-range; criteria)

انتهت الأسئلة بالتوفيق والنجاح للجميع،،،،، د. شيرين علي محمد السيد

Answer the following (MCQ) questions: (50 Marks)

1. which of this is not a network edge device?
A) switch B) Servers C) PC D) all of above
2. interconnected routers and network of networks
A) network core B) network edge C) none of above D) A and B
3. hosts equal
A) End systems B) End protocols C) End networks D) another answer
4. What is the primary function of packet-switching in network communications?
A) To ensure data security through encryption.
B) To divide messages into smaller packets for transmission.
C) To increase the data transmission rate to its maximum potential.
D) To assign IP addresses to devices on a network.
5. The following term is not associated with DSL
A) DSLAM B) Splitter C) CMTS D) all of above
6. DSL phone line goes to Internet
A) voice over B) data over C) none of all D) A & B
7. $L = 7.5$ Mbits and $R = 1.5$ Mbps one-hop transmission delay equal
A) 5 sec B) 9 sec C) 10 sec D) another answer
8. Time Needed To Transmit L-Bit Packet Into Link Equal.....
A) L/R B) $L \cdot R$ C) R/L D) no of above
9. What role does TCP/IP play in computer networks?
A) It serves as the primary data storage protocol.
B) It is used for physical connection between network devices.
C) It provides a suite of communication protocols for the internet.
D) It enhances the graphical interface of web browsers.
10. In a network, what does the term 'throughput' refer to?
A) The total amount of data that can be stored on the network.
B) The speed at which data is encrypted and decrypted.
C) The rate at which data is successfully transferred from one place to another.
D) The number of errors encountered during data transmission.
11. Which of the following best describes a 'router' in a computer network?
A) A device that forwards data packets between computer networks.
B) A device that converts digital signals to analog signals.
C) A device that stores data for network users.
D) A device that primarily protects the network from unauthorized access.
12. time waiting at output link for transmission is?
A) nodal processing B) queueing delay C) transmission delay D) A and C

13. Which layer of the OSI model is responsible for routing of packets across a network?
 A) Application Layer B) Presentation Layer C) Network Layer D) Physical Layer
14. Which of the following best defines 'packet sniffing' in network security?
 A) Encrypting packets for secure transmission.
 B) Discarding suspicious network packets.
 C) Capturing and analyzing packets traveling over a network.
 D) Increasing the speed of packet transmission.
15. What is the primary function of a firewall in a network?
 A) To increase data transmission speeds.
 B) To prevent unauthorized access to or from a private network.
 C) To store data centrally for network users.
 D) To provide a user interface for network management.
16. How many layers are present in the Internet protocol stack (TCP/IP model)?
 A) 7 B) 5 C) 6 D) 10
17. Which is not a Transport layer protocol?
 A) UDP B) SMTP C) TCP D) all of above
18. Which Link layer protocol?
 A) UDP B) Ethernet C) TCP D) all of above
19. The packet of information at the application layer is called _____.
 A) Message B) Packet C) Segment D) all of above
20. Which technology is used for encapsulating network layer datagrams into link-layer frames?
 A) TCP/IP B) DNS C) Link-layer protocols like Ethernet or WiFi.
 D) Application-layer protocols like HTTP or FTP.
21. Which layer of the OSI model is responsible for ensuring error-free transmission of data?
 A) Application Layer B) Presentation Layer C) Session Layer D) Data Link Layer
22. What role does the Session Layer play in the OSI model?
 A) It is responsible for physical data transfer. B) It encrypts and compresses data.
 C) It manages the connection and maintains sessions. D) all mentioned
23. What is the main function of the Presentation Layer in the OSI model?
 A) It provides end-to-end data transport services.
 B) It translates, encrypts, and compresses data.
 C) It manages data packets between multiple networks.
 D) It controls the physical hardware used for data transmission.
24. What is network apps from these?
 A) social networking and text messaging B) Web and e-mail C) No correct answer D) A and B
25. Which one of the following is an architecture paradigms?
 A) Peer to peer B) Client-server C) HTTP D) Both Peer-to-Peer & Client-Server

26. examples of clients server

- A) HTTP B) IMAP C) FTP D) All of above.

27. Which of the following is a characteristic of peer-to-peer

- A) P2P file sharing B) SMTP C) HTTP D) IMAP

28. applications with P2P architectures have ____

- A) client processes B) server processes C) client processes & server processes
D) No correct answer

29. identifier includes ____ associated with process on host.

- A) IP address B) port numbers C) both IP address and port numbers
D) No correct answer

30. Mail server port number is.....

- A) 25 B) 80 C) 100 D) 30

31. meaning of information in fields

- A) message semantics B) rules C) message syntax D) response

32. some apps (e.g., multimedia) require minimum amount of _____ to be "effective"

- A) data integrity B) timing C) throughput D) Encryption of data

33. What does SMTP stand for?

- A) Simple Mail Transfer Protocol B) Secure Messaging Transport Protocol
C) Server Mail Transfer Protocol D) Simple Message Transmission Protocol

34. HTTP: hypertext transfer protocol include

- A) Web's application-layer protocol B) client C) server
D) Web's application-layer protocol and client/server model

35. HTTP uses

- A) TCP B) UDP C) A & B D) No correct answer

36. what is the different between non-persistent HTTP and Persistent HTTP?

- A) TCP connection closed B) TCP connection opened
C) in non-persistent HTTP at most one object sent over TCP connection, *Persistent HTTP* in multiple objects can be sent over *single* TCP
D) No correct answer

37. Non-persistent HTTP response time =

- A) $2RTT + \text{file transmission time}$ B) $5RTT + \text{file transmission time}$
C) $3RTT + \text{file transmission time}$ D) $RTT + \text{file transmission time}$

38. types of HTTP messages ____

- A) request B) response C) A&B D) No correct answer

39. status code: 505 HTTP is....

- A) Version Not Supported B) requested document not found on this server
C) A&B D) another answer

40. status code: 301 HTTP is....

- A) Version Not Supported B) requested document not found on this server
C) Moved Permanently D) Bad Request

41. status code: 404 Not Found

- A) Version Not Supported B) requested document not found on this server
C) A&B D) another answer

42.delivery/storage of e-mail messages to receiver's server

- A) SMTP B) HTTP C) TCP D) non of above

43. DNS is the abbreviation of

- A) Domain Name System B) Dynamic Name System C) Domain Network Service
D) non of above

44. attackers make resources (server, bandwidth) unavailable to legitimate traffic by overwhelming resource with bogus traffic.

- A) virus B) worm C) spyware D) DoS

45. Reliable data transfer is available at

- A) TCP B) UDP C) A & B D) non of above

46. Unreliable data transfer is available at

- A) TCP B) UDP C) A & B D) non of above

47. transport layer: communication between

- A) processes B) app messages C) hosts D) A and B

48. network layer: communication between

- A) processes B) app messages C) hosts D) A and B

49. TCP socket identified by

- A) source IP address B) dest IP address and dest port number C) source port number
D) all of above

50. ____ demultiplexing using destination port number (only)

- A) TCP B) UDP C) FTP D) HTTP