5. The function $f(z)=z^2+\overline{z}$ is nowhere analytic.
6. The function $f(z)=\cos(y)-i\sin(y)$ is nowhere differentiable.
7. The function $\sin(\overline{z})$ is nowhere analytic.
8. The function $\cos(z)$ is a periodic function with a period of 2π.
9. The principal value of i^{i+1} is $e^{-\frac{\pi}{2}+i}$.
10. The domain of the function $f(z)=\dfrac{1}{z^2+i}$ is all complex numbers.

Question Six: (10 marks)

Fill in the blanks to complete the following statements.

1. If $a+ib=\dfrac{3-i}{2+3i}+\dfrac{2-2i}{1-5i}$, then $a=$…… and $b=$……
2. If $z=\dfrac{4i}{-3-4i}$, then $|z|=$……
3. If $z=3+4i$, then $\mathrm{Re}\left(\dfrac{z}{\overline{z}}\right)=$……
4. The principal argument of $z=-1-i$ is ……
5. $i^{127}-5i^9+2i^{-1}=$……
6. If $z=\dfrac{5}{-\sqrt{3}+i}$, then $Arg(z)=$……
7. If $f(z)=z^2+i\overline{z}$, then the real and imaginary parts of $f(z)$ are $u(x,y)=$……and $v(x,y)=$……
8. If $f(z)=\dfrac{1}{z^2+5iz-4}$, then $f'(z)=$……
9. The function $f(z)=\dfrac{1}{z^2+5iz-4}$ is not analytic at ……
10. The principal value of i^i is ……

Question Seven: (10 marks)

By Choose the correct answer from the given four options.

Please turn the page

1. The principal value of $\log\left(\sqrt[4]{i}\right)$ is ……			
a. πi	b. $\frac{\pi i}{2}$	c. $\frac{\pi i}{4}$	d. $\frac{\pi i}{8}$
2. The value of $\left\|e^{i\theta}\right\|$ is ……			
a. 1	b. i	c. -1	d. 0
3. The principal value of $(-i)^i$ is ……			
a. $e^{\frac{\pi}{4}}$	b. $e^{-\frac{\pi}{4}}$	c. $e^{-\frac{\pi}{2}}$	d. $e^{\frac{\pi}{2}}$
4. The radius of convergence of the series $\sum_{n=0}^{\infty}\frac{z^n}{n!}$ is ……			
a. 0	b. 1	c. -1	d. ∞
5. The singularity of the function $f(z)=\frac{e^z}{z^2}$ is ……			
a. 0	b. 1	c. -1	d. 2
6. The order of the zeros of the function $f(z)=\frac{\sin(z)}{z+4}$ is ……			
a. 1	b. 2	c. 3	d. 4
7. The zero of the function $f(z)=\frac{z}{\cos(z)}$ is ……			
a. 1	b. 0	c. -1	d. π
8. The integral $\int_{\lvert z\rvert=2}\frac{1}{z^3}dz$ equals to ……			
a. 0	b. $2\pi i$	c. $-2\pi i$	d. πi
9. Calculate the integral $\int_{\lvert z\rvert=1}\frac{2z+1}{z^2+z}dz$ equals to ……			
a. $4\pi i$	b. $2\pi i$	c. $-2\pi i$	d. None of these
10. Evaluate the integral $\oint_{\lvert z\rvert=1}e^{\bar{z}}dz$ equals to ……			
a. 0	b. $2\pi i$	c. $-2\pi i$	d. None of these

With best wishes, Prof. Dr. Ayman Shehata and Dr. Shimaa I. Moustafa

Δ Remember ■Understand •Apply ◊Analysis *Evaluate ◯ Create

	Assiut University- Faculty of Science Second Semester- Final Exam 2025-2026 Mathematics Department	Level : (4) Date: 24/5/2026 Time: 2 hrs	
Course Title: Scientific Computation (2)			Code: MC462
Instructors: Dr. Amira Allam			
Important:	No. of pages 5	No. Of questions 5	Total Mark: 50 degrees

Question 1: Choose the correct answer, put the answers in the table (5 Marks)

Suppose we have a universal set U = {1, 2, 3, 4, 5, 6}, and we define two events A and B as follows:

A: The event of rolling an even number on a fair six-sided die.
B: The event of rolling an odd number on a fair six-sided die.

1. The probability of the event of rolling an even number on a fair six-sided die. P(A) is
a) 0.25 b) 3 c) 0.5 d) 12

2. The probability of $A \cap B$, P($A \cap B$)
a) 1 b) 0.5 c) 6 d) 0

3. The probability of B^c is
a) 0 b) 1 c) 0.5 d) 0.1

4. The probability of $(A \cup B)^c$ is
a) {1,2,3,4,5,6} b) 1 c) 0 d) 0.5

5. The event of A^c is
a) {1,2,3,4,5,6} b) {2,4,6} c) {1,3,5} d) 0

Question 2: Choose the correct answer, put the answers in the table (10 Marks)

The random variable X has the following probability distribution.

x	-3	2	6	8
P(x)	0.2	0.3	0.4	0.1

1. Is this probability distribution valid?
a) True b) False

2. P(X ≥ 0) =
a) 1 b) 0 c) 0.8 d) 0.9

3. P(2< X <5) =
a) 0 b) 1 c) 0.2 d) 0.1

4. The probability that x = 1 is
a) 1 b) 0.2 c) 0 d) 0.3

5. The expected value of X, E(X) is
a) 2 b) 3.75 c) 3.2 d) 0

6. The variance value of X, V(X) is
a) 23.5833 b) 13.56 c) 6.66 d) 3.333

7. The expected value of 10 , E(10) is
a) 100 b) 0 c) 8 d) 10

8. The expected value of E(X+10) is
a) 13.2 b) 3.2 c) 0 d) 13.75

9. The variance value of V(X+10) is

a) 33.5833 b) 23.56 c) 23.5833 d) 13.56

10. The expected value of X, E(10X) is

a) 320 b) 37.5 c) 32 d) 375

Question 3: Choose the correct answer, put the answers in the table (20 Marks)

1. If P(A|B)=P(A), then A and B are:

a) Mutually exclusive b) Dependent c) Independent d) Exhaustive

2. Which measure of central tendency is most affected by outliers?

a) Median b) Mode c) Mean d) Range

3. The position of the median for a dataset with 15 values is:

a) 7th b) 8th c) 7.5th d) 15th

4. A measure of variation that has the same units as the original data is:

a) Variance b) Range c) Standard deviation d) Coefficient of variation

5. If all values in a dataset are identical, the standard deviation is:

a) 1 b) 0 c) negative d) positive

6. For an even number of observations, the median is:

a) The middle number b) The smallest number c) The most frequent number d) The average of the two middle numbers

7. Which measure is not a measure of variation?

a) Mode b) Range c) Variance d) Standard deviation

8. The variance can never be:

a) 1 b) 0 c) negative d) positive

9. CV is calculated as:

a) (Mean / SD) × 100 b) (SD / Mean) × 100 c) (Range / Mean) × 100 d) (Variance / Mean) × 100

10. A coin is tossed 50 times and lands on heads 32 times. What is the empirical probability of getting tails?

a) 32/50 b) 18/50 c) 1/2 d) 50/18

11. Which of the following is an example of an infinite sample space?

a) Flipping a coin twice b) Rolling a die once c) Measuring the exact time it takes a student to complete an exam d) Drawing one card from a standard deck

12. Two cards are drawn without replacement from a standard deck. The probability that both are hearts is:

a) A) (13/52) × (13/52) b) (13/52) + (12/51) c) (13/52) × (12/51) d) (13/52) × (13/51)

13. If P(A) = 0.5, P(B) = 0.4, and A and B are independent, then P(A ∩ B) = ?

a) 0.9 b) 0.2 c) 0.1 d) 0.02

14. Which of the following is NOT a valid probability?

a) 0 b) 0.5 c) 1.2 d) 1

15. A random variable that takes countable values is called:

a) Continuous b) Binomial c) Discrete d) Constant

16. Which of the following is a discrete random variable?

a) Height of students b) Weight of apples c) Number of defective radios d) Temperature

17. Which distribution is bell-shaped and symmetric?

a) Uniform b) Exponential c) Normal d) Binomial

18. The total area under the normal curve is:

a) 0.5 b) 1 c) π d) ∞

19. The mean of a uniform distribution on [a, b] is:

a) 33.5833 b) 23.56 c) 23.5833 d) 13.56

10. The expected value of X, E(10X) is

a) 320 b) 37.5 c) 32 d) 375

Question 3: Choose the correct answer, put the answers in the table (20 Marks)

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a) Uniform b) Exponential c) Normal d) Binomial

18. The total area under the normal curve is:

a) 0.5 b) 1 c) π d) ∞

19. The mean of a uniform distribution on [a, b] is:

a) $(b - a)/2$ b) $[(b - a)^2/12]$ c) $(a + b)/2$ d) $1/\lambda$

20. What is the area under the normal curve between $z = -5.09$ and $z = 5.09$?

a) 3.9 b) 1 c) 0 d) 0.5

The Answers Tables

Question 1:	1	2	3	4	5

Question 2:	1	2	3	4	5	6	7	8	9	10

Question 3:	1	2	3	4	5	6	7	8	9	10
	11	12	13	14	15	16	17	18	19	20

	Assiut University- Faculty of Science **Second Semester - Final Exam 2025-2026** **Mathematical Department**	**Program: Mathematics** **Level : (4)** **Date: 10/ 6 /2026** **Time: 2 h**	
Course Title: Theory of Rings & Fields		**Code: 322 M**	
Instructors: Prof. Dr. Ahmed Allam			
Important:	**No. of pages 2**	**No. Of questions 18**	**Total Mark: 50 degree**

Choose the correct answer from those given(2 degrees for each point)

onsider a mathematical system $(Z_{13},+_{13},\cdot_{13})$,then;

1-The additive identity 0 = a) [1] b) [2] c)[0]

2-The multiplicative identity 1 = a) [1] b) [2] c)[0]

3-The additive inverse of [2] = a) [3] b) [6] c)[11]

4-The multiplicative inverse of [2] = a) [7] b) [5] c)[4]

5- If $[-19]+_{13}[8]=[x]^{-1}$, then x= a) 11 b) 2 c) 4

6- $[-20]^{-1}\cdot_{13}[2]=[x]$, then x = a) 11 b) 9 c) 3

Let $(Z,*,\circ)$ be a mathematical system , where Z is the integer numbers , $a*b=a+b-2$ *and* $a\circ b=a+b-ab$,$\forall a.b\in R$, *then* ;

7-The additive identity 0 is a) 1 b) 2 c) 0

8-The multiplicative identity 1 is a) 1 b) 2 c) 0

9-The additive inverse of 5 = a) -1 b) 1 c) 2

10-The multiplicative inverse of 5 is a) $\frac{5}{4}$ b) $\frac{6}{4}$ c) $\frac{7}{3}$

Choose True for a correct answer or False otherwise(2 degrees for each point)

11 - the distribution property is symmetric

(a) True (b) False.

12 the distribution property is not reflexive

(a) True (b) False.

13) Generally the ring does not satisfy the laws of multiplication elimination.

(a) T*rue* (b) F*alse.*

14- *A ring* $(3Z,+,.)$ *does not ideal of the ring* $(Z,+,.)$.

(a) True (b) False.

15 - $(N,+,.)$ is a subring of the ring $(Z,+,.)$.

(a) True (b) False.

Please look the rest of questions

16) Let $(R,+,.)$ be an commutative ring $\circ$ is anther binary operation on R defined as follows;

$$a\circ b=a.b+b.a,\ \forall\, a,b\in R$$

Prove that a system $(R,+,\circ)$ is a is a complete ring . (10 degrees)

17) Give an example to show that the union od two ideal subrings generally need not be an ideal subring . (5 degrees)

18) Prove that a field is a complete ring . (5 degrees)

::

End of Exam

Best Wishes **Prof. Dr Ahmed Allam.**

Dr.Amira Allam

	Assiut University- Faculty of Science **Second Semester - Final Exam 2025-2026** **Mathematical Department**	**Program: Mathematics** **Level : (4)** **Date: 10/ 6 /2026** **Time: 2 h**	
Course Title: Theory of Rings & Fields		**Code: 322 M**	
Instructors: Prof. Dr. Ahmed Allam			
Important:	**No. of pages 2**	**No. Of questions 18**	**Total Mark: 50 degree**

Choose the correct answer from those given(2 degrees for each point)

onsider a mathematical system $(Z_{13},+_{13},\cdot_{13})$,then;

1-The additive identity 0 = a) [1] b) [2] c)[0]

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5- If $[-19]+_{13}[8]=[x]^{-1}$, then x= a) 11 b) 2 c) 4

6- $[-20]^{-1}\cdot_{13}[2]=[x]$, then x = a) 11 b) 9 c) 3

Let $(Z,*,\circ)$ be a mathematical system , where Z is the integer numbers , $a*b=a+b-2$ *and* $a\circ b=a+b-ab$,$\forall a.b\in R$, *then* ;

7-The additive identity 0 is a) 1 b) 2 c) 0

8-The multiplicative identity 1 is a) 1 b) 2 c) 0

9-The additive inverse of 5 = a) -1 b) 1 c) 2

10-The multiplicative inverse of 5 is a) $\frac{5}{4}$ b) $\frac{6}{4}$ c) $\frac{7}{3}$

Choose True for a correct answer or False otherwise(2 degrees for each point)

11 - the distribution property is symmetric

(a) True (b) False.

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(a) True (b) False.

13) Generally the ring does not satisfy the laws of multiplication elimination.

(a) T*rue* (b) F*alse.*

14- *A ring* $(3Z,+,.)$ *does not ideal of the ring* $(Z,+,.)$.

(a) True (b) False.

15 - $(N,+,.)$ is a subring of the ring $(Z,+,.)$.

(a) True (b) False.

Please look the rest of questions

Faculty of science
Assiut University
2nd Semester 2026

Computer Security-4th Level
50 Marks
2 Hour

Question 1: Choose the correct answer **(40 points)**

1. Users A and B use the Diffie-Hellman key exchange technique with a common prime p = 31 and generator g=3. If user A has private key XA = 11, and if user B has private key XB = 9 .What is the shared secret key?

   a) 29
   b) 15
   c) 23
   d) 30

2. In RSA, if n=55, e=3 and ciphertext is 8 then the plaintext is:

   a) 28
   b) 17
   c) 32
   d) 2

3. If an alphabet consists of only 5 characters (A, B, C, D, E), what is the maximum number of unique decryption attempts required to brute-force a simple substitution ciphertext (General Case)?

   a) 5
   b) 25
   c) 120
   d) 5^5

4. In knapsack cryptosystem, let the private key be (2,3,7,14), and m = 5 and n = 29. If the ciphertext is 12, What is the original binary message?

   a) 1101
   b) 0001
   c) 1110
   d) 1001

5. In DES system, how many blocks are needed to encrypt a 512-bit message?

   a) 8
   b) 16
   c) 32
   d) 64

6. In A5/1 cipher, when register Z steps which one is true:

   a) $z_0=z_7 \oplus z_{20} \oplus z_{21} \oplus z_{22}$
   b) $z_0=z_{13} \oplus z_{16} \oplus z_{17} \oplus z_{18}$
   c) $z_0=x_{13} \oplus x_{15} \oplus x_{16} \oplus x_{18}$
   d) $z_0=z_{17} \oplus z_{21} \oplus z_{22}$

7. In hill cipher if the Plaintext is "HELP", Ciphertext is " ZEBB" , and Block size = 2 What is the Second and Third values of the key

a) Second 19 Third 14
b) Second 11 Third 14
c) Second 19 Third 19
d) Second 2 Third 12

8. For the following RC4 algorithm, line vii is:

```
 i. for i = 0 to 255
 ii.        S[i] = i
 iii.       T[i] = key[i (mod N)]
 iv. next i
 v. j = 0
 vi. for i = 0 to 255
 vii. ----------------------------
 viii.      swap(S[i], S[j])
 ix. next i
 x. i = j = 0
 xi. i = (i + 1) mod 256
 xii. ----------------------------
 xiii. swap(S[i], S[j])
 xiv. ----------------------------
 xv. keystreamByte = S[t]
```

a) j = (j+ S[i] + T[j]) mod 256
b) j = (j + T[i]) mod 256
c) j = (j + S[i] + T[i]) mod 256
d) j = (S[i] + T[j]) mod 256

9. For the previous RC4 algorithm, line xii is:

a) j = S[i]+T[j] mod 256
b) j = (j + S[i]) mod 256
c) j = (j + S[j]) mod 256
d) j = (j+ T[i]) mod 256

10. For the previous RC4 algorithm, line xiv is

a) t = S[i] mod 256
b) t = (S[i] + T[j]) mod 256
c) t = (S[i+j]) mod 256
d) t = (S[i] + S[j]) mod 256

11. The DES round equation for the right half in encryption is:

a) $R_i=L_{i-1}$
b) $R_i=L_{i-1}\oplus F(R_{i-1},K_i)$
c) $R_i= R_{i-1}\oplus F(L_{i-1},K_i)$
d) $R_i= L_i\oplus F(R_{i-1},K_{i-1})$

12. What will be the ciphertext corresponding to plaintext "Hello" if an affine cipher is used with key values as a=3, b=11?

a) GXSSB
b) CVUUB
c) JAVVE
d) VMHQ

13. What will be the plaintext if rail fence cipher is used for decrypting the ciphertext "HOOLELWRD " with the key value given to be 3?

a) HLLOEWDOL
b) HLREOLDWO
c) HEDOLLROW
d) HLOWORLDE

14. What will be the encrypted text corresponding to plaintext "ATTACK AT DOWN" using columnar transposition cipher with the keyword "DATA"?

a) TCAKNDWOAATT
b) ACKOWNATTATD
c) AAOATTWCDTNK
d) TKOATNACDTAW

15. Two parties that have never communicated before wish to send messages using asymmetric key cryptography. How should the parties begin?

a) The receiving party should send its private encryption key to the transmitting party.
b) The transmitting party should send its private encryption key to the receiving party.
c) The receiving party should send its public encryption key to the transmitting party.
d) The transmitting party should send its public encryption key to the receiving party.

16. Using one time pad, what will be the plaintext resulting from decrypting "welcome" with key "XMCKLEN" modulo 26 ?

a) EQNVZWX
b) ZSJSDIR
c) QJKESRS
d) TQNMZQR

17. Each DES S-box contains:

a) 2 rows and 8 columns
b) 4 rows and 16 columns
c) 8 rows and 8 columns
d) 16 rows and 16 columns

18. The lengths of the three registers x,y,z in A5/1 are:

a) 18, 21, 22
b) 18, 21, 23
c) 19, 22, 23
d) 17, 23, 24

19. What will be the ciphertext corresponding to plaintext "SANFOUNDRY" if playfair cipher is used with keyword "SECRET"?

a) SVOGPNOFTZ
b) AHAQPUAPFY
c) AHQAPNPAFR
d) SVAQNQAPQY

20. What will be the ciphertext corresponding to plaintext "CODE" , If the general Caesar Cipher key is 7

a) FRGH
b) KQFG
c) DPEF
d) JVKL

Write down the right answer (A or B or C or D) in this table									
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

Question 2: True or False (10 points)

1. DES uses 8 rounds Festial structure
2. The total output size after all 8 S-boxes in one DES round is 32 bit
3. Vigenère Tableau Cipher is a set of substitution rules consists of the 25 general Caesar ciphers
4. The total number of valid keys "a" in Affine cipher is 12
5. Hash function produces a fixed-size output regardless of input size
6. In Vigenère Tableau Cipher, the Key is repeated when it is shorter than the plaintext
7. If the determinant is even, the Hill cipher key is always invalid
8. The Iris pattern is changed throughout a human lifetime, so that Iris is the best for authentication
9. For columnar transposition, if a ciphertext is 65 letters, it is easier to be broken if a 5×13 rectangle were used for the encrypting than 13×5
10. A5/1 is a stream cipher with a fixed key size

Write down the right answer (T or F) in this table									
1	2	3	4	5	6	7	8	9	10

	Assiut University- Faculty of Science **Frist Semester- Final Exam 2025-2026** **Mathematics Department**	**Program: Mathematics** **Level: 4** **Date: 31/12/2025** **Time: 3 h**	
Course Title: Mathematical Statistics		**Code: 442 ر**	
Instructors: Prof. Dr. Abd EL-Baset A. Ahmad			
Important:	**No. of pages 2**	**No. Of questions 5**	**Total Mark: 50 degree**

Answer the following questions: (10 degrees for each question)

(1) Let X and Y be discrete random variables with bpmf

$$f_{X,Y}(x,y)=\begin{cases}\frac{x+y}{32}, & x=1,2,\ y=1,2,3,4,\\ 0. & o.w\end{cases}$$

Find: (i) $f_X(x)$ and $f_Y(y)$ (ii) $F_{X,Y}(x,y)$ (iii) $f_{Y|X}(y|2)$ (vi) $F_{Y|X}(y|2)$ (vii) $E[Y|X=2]$

(2) Let X and Y have bpdf

$$f_{X,Y}(x,y)=\begin{cases}\frac{1}{64}e^{-y/8}, & 0<x<y<\infty,\\ 0, & o.w\end{cases}$$

Find: (i) $f_{Y|X}(y|x)$ (ii) $F_{Y|X}(y|x)$ (iii) $V(Y|X)$ (iv) $Cov(X,Y)$ (v) $\rho(X,Y)$

(3) (a) Suppose that X has the pdf $f_X(x)=\begin{cases}\frac{x}{16}e^{-\frac{x}{4}}, & x>0,\\ 0, & o.w\end{cases}$ and $Z=\begin{cases}-2, & 0\le x<1,\\ 0, & 1\le x<3,\\ 2, & x\ge 3.\end{cases}$

Find the pmf of the random variable Z.

(b) Suppose that X and Y are independent random variables where $X\sim gamma(\alpha_1,\beta)$ and $Y\sim gamma(\alpha_2,\beta)$. Find the pdf of $Z=\frac{X}{X+Y}$

(4) (a) Let $X_1,X_2,\dots,X_n$ be a random sample drawn from a population has a normal distribution with parameters μ and σ^2. Find the estimators of μ and σ^2 by using:

(i) Method of Moments. (ii) Method of Maximum likelihood.

(b) If the random sample $X_1,X_2,\dots,X_n$ is drawn from a population has the normal distribution with parameters μ and σ^2. If the estimator of μ is given by the form $\hat{\mu}=\bar{x}$, then prove that

(i) $\hat{\mu}$ is an unbiased estimator for μ. (ii) $\hat{\mu}$ is estimator for μ (iii) $\hat{\mu}$ is MVUE for μ.

(5) (a) Let $\hat{\theta}_1$ and $\hat{\theta}_2$ be estimators of a population parameter θ based upon the same random sample. If $\hat{\theta}_i \sim N(\theta; \sigma_i^2)$, $i = 1,2$, and if $\hat{\theta} = k\hat{\theta}_1 + (1-k)\hat{\theta}_2$, then:

(i) prove that $\hat{\theta}$ is unbiased estimator of θ.

(ii) prove that $\hat{\theta}$ is a minimum variance unbiased estimator of θ when $k = \frac{\sigma_2^2}{\sigma_1^2+\sigma_2^2}$.

b) Let X and Y be independent random variables with $X \sim N(0,1)$ and $Y \sim \chi^2(\gamma)$. If the random variable Z is such that $Z = \frac{X}{\sqrt{Y/\gamma}}$. Prove that $Z \sim t(\gamma)$.

Helpful Formulas:

$$X \sim gamma(\alpha,\beta) \Rightarrow f_X(x) = \frac{\beta^\alpha}{\Gamma(\alpha)} x^{\alpha-1} e^{-\beta x}, \qquad x > 0.$$

$$X \sim N(\mu,\sigma^2) \Rightarrow f_X(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2\sigma^2}(x-\mu)^2}, -\infty < x < \infty.$$

$$Z \sim t(\gamma)) \Rightarrow f_Z(z) = \frac{\Gamma(\frac{\gamma+1}{2})}{\Gamma(\gamma/2)\sqrt{\gamma\pi}} \frac{1}{\left(1+\frac{z^2}{\gamma}\right)^{(\gamma+1)/2}}, \quad -\infty < z < \infty$$

Best wishes,,, Prof. Dr. Abd EL-Baset Abdullah Ahmad

	Faculty of science	**Computer Security-4th Level**
	Assiut University	**50 Marks**
	1st Semester 2026	**2 Hour**

Question 1: Choose the correct answer **(40 points)**

1. Users A and B use the Diffie-Hellman key exchange technique with a common prime p = 13 and generator g=2. If user A has private key XA = 5, and if user B has private key XB = 6 .What is the shared secret key?
   a) 6
   b) 8
   c) 11
   d) 12

2. In RSA, if p=3, q=11, e=3 encrypt message M=4:
   a) 9
   b) 16
   c) 31
   d) 64

3. A Brute Force attack on a Simple substitution cipher (general Case) written in Arabic would require a maximum of ----------trials.
   a) 25!
   b) 26!
   c) 2^{88}
   d) 28!

4. In knapsack cryptosystem, let the private key be (2,3,7,14), and m = 3 and n = 31. If the ciphertext is 26, What is the original binary message?
   a) 1011
   b) 1101
   c) 0111
   d) 1001

5. The input to S-box 2 is 101010. Which one is the output?

S_2

15	1	8	14	6	11	3	4	9	7	2	13	12	0	5	10
3	13	4	7	15	2	8	14	12	0	1	10	6	9	11	5
0	14	7	11	10	4	13	1	5	8	12	6	9	3	2	15
13	8	10	1	3	15	4	2	11	6	7	12	0	5	14	9

   a) 1010
   b) 1111
   c) 0010
   d) 0100

6. Which of the following ciphered text would have NOT used transposition cipher for encryption of the plain text "CIPHER"?
   a) EPIHRC
   b) EHIPCR
   c) DTIPRC
   d) HRIPEC

	Arab Republic of Egypt Ministry of Higher Education Assiut University- Faculty of Science Mathematics Department Second Semester- Final Exam 2025-2026	Program: Mathematics Level : (4) Date: 24 / 5 /2026 Time: 3 h	
Course Title: Complex Variables		Code: 412 Math	
Instructors: Prof. Dr. Ayman Shehata and Dr. Shimaa I. Moustafa			
Important: Answer only five of the questions	No. of pages 4	No. Of questions 7	Total Mark: 50 degree

Answer only five of the following questions:

Question One: (10 marks = 2+2+2+2+2)

1. Study the existence of the limit $\lim_{z\to 0}\left(\frac{\bar{z}}{z}\right)^2$.
2. Given the sequence $z_n=\int_0^{\frac{1+i}{\sqrt{2}}}\frac{z^n}{n+z}dz$, show that $\lim_{n\to\infty} z_n=0$.
3. Find the maximum of $|f(z)|$ in $|z|\le 1$ for the function $f(z)$ given by $f(z)=z^2+2z-1$.
4. Let $f(z)$ be analytic inside and on a circle C of radius r and center at $z=a$. Prove Cauchy's inequality $|f^{(n)}(a)|\le\frac{M.n!}{r^n}, n=0,1,2,3,\cdots$, where M is a constant such that $|f(z)|<M$.
5. If $f(z)$ is analytic function with derivative $f'(z)$ which is continuous at all points inside and on a simple closed curve C, prove that $\oint_C f(z)dz=0$.

Question Two: (10 marks = 2+2+3+3)

1. Investigate the convergence of $\sum_{n=1}^{\infty}\frac{e^{inz}}{n^2}$.
2. Describe the type of singularity at $z=0$ of the function $f(z)=\frac{\cos(z)-1}{z}$.
3. Define the Harmonic Function and prove that $u=y^3-3x^2y$ is harmonic function. Find the harmonic conjugate function of u.
4. Using contour integration, calculate the integral $\int_0^{2\pi}\frac{\cos(3\theta)}{5-4\cos(\theta)}d\theta$.

Question Three: (10 marks = 2+2+3+3)

1. Discuss the **uniformly continuous** of the function $f(z)=\sin(z)$ in complex plane.

Please turn the page

Faculty of Science **Assiut University** **2nd Semester 2026**	**Image Processing – 3rd Level** **2 Hours** **50 Marks**	

Question 1: Determine whether these statements are true (T) or false (F) (10 Points)

1. A digital image can be considered as a discrete representation of data that possess spatial and intensity information.
2. The effectiveness of digital image processing operations depends mainly on user expertise.
3. The choice of noise removal technique depends mainly on the noise characteristics present in the image.
4. The total number of bites required to store 5X5 image with 64 gray levels is 1600 bits.
5. Given the result of subtracting two images, the original images can always be perfectly recovered.
6. Converting a grayscale image to a binary image results in loss of information while reducing computational complexity.
7. Image subtraction is commonly used in video processing to detect motion between consecutive frames.
8. In grayscale conversion, the red, green, and blue channels contribute equally when computing pixel intensity.
9. JPEG is the preferred image format for archiving medical scans because it preserves all image information.
10. The main drawback of the absolute difference operation is that it loses information about which image contains the brighter pixel.

Write down the right answer (T or F) in this table									
1	2	3	4	5	6	7	8	9	10

Question 2: Choose the correct answer (40 Points)

1. Which image processing operation intentionally smooths an image and reduces fine details?

A) Sharpening B) Blurring C) Segmentation D) Contrast Enhancement

2. Given the normalized grayscale image I below, how many pixels will be assigned the value 1 (white) after applying im2bw(I,0.5)?

0.2	0.8	1
0.6	0.3	0.5
0.4	0.7	0.9

A) 3 B) 5 C) 6 D) 9

3. Given two 5-bit images A and B that are added pixel by pixel. What will be the resulting pixel valu at the position (3,1) after the normalized addition?

A =

14	30	25
16	8	15
5	10	1

B =

15	20	5
10	30	19
16	5	11

A) 7 B) 8 C) 12 D) 21

4. What visual artifact is most likely to appear when an image is rotated using the nearest-neighbor interpolation method?

A) Blockiness effect B) Loss of image details C) Blurring effect D) Jagged straight lines

5. Multiplying a grayscale image by a scalar value of 0.5 generates a ..... image.

A) Black B) Brighter C) Darker D) Binary

6. Image division is commonly used for .....

A) Edge detection B) Noise removal C) Artificial 3D effects D) Background removal

7. Which of the following pixels will have the highest intensity after applying intensity inversion for an 8-bit grayscale image?

A) 20 B) 50 C) 100 D) 200

8. Suppose the intensity values of two corresponding pixels in two 8-bit images A and B are 120 and 200, respectively. What will be the intensity value of the resulting pixel in C = bitxor(A, B)?

A) 176 B) 72 C) 248 D) 79

9. Which MATLAB function is commonly used to calculate the negative of a grayscale image?

A) bitcomplement() B) imcmp() C) imnegative() D) imcomplement()

10. A colormap of an MxN indexed image in MATLAB is typically represented as a(n) .....

A) M X N matrix B) M X 3 matrix C) 3 X C matrix D) C X 3 matrix

11. How many neighboring pixels are considered in the Bicubic interpolation method?

A) 4 B) 9 C) 16 D) 25

12. An image is sheared by shearing factors [4, 3]. What are the new coordinates of the pixel (2,1) after shearing?

A) (6, 7) B) (5, 9) C) (4, 6) D) (3, 8)

13. An image is scaled by scaling factors [2,4]. If a pixel appears at coordinates (4,4) in the scaled image, what were its coordinates in the original image?

A) (8, 16) B) (2, 1) C) (6, 5) D) (12, 20)

14. A ..... interpolation method generally produces the highest-quality image results.

A) Simple B) Bilinear C) Nearest-neighbor D) Bicubic

15. An image is first rotated by 90° clockwise, then translated by 5 towards x-axis and 3 towards y-axis. What are the new coordinates of the pixel (3,4) after transformation?

A) (−7, 8) B) (9, 0) C) (1, 6) D) (7, −8)

16. A histogram with most of its values near intensity 220–255 most likely corresponds to .....

A) Dark image B) Bright image C) Low-contrast image D) High-contrast image

3. Given two 5-bit images A and B that are added pixel by pixel. What will be the resulting pixel valu at the position (3,1) after the normalized addition?

A =

14	30	25
16	8	15
5	10	1

B =

15	20	5
10	30	19
16	5	11

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16. A histogram with most of its values near intensity 220–255 most likely corresponds to .....

A) Dark image B) Bright image C) Low-contrast image D) High-contrast image

17. Given the 8-bit grayscale image below, what is the output intensity of the pixel at (3,4) af performing histogram sliding by 30 to the right?

30	20	10	30	50
60	30	70	80	130
200	40	93	240	67
87	98	190	50	0
193	255	40	12	23

A) 210 B) 240 C) 255 D) 270

18. Given the mapping table of the desired histogram after equalization, the equalized gray value $s_k = 3$ should be mapped to which gray level z_k during histogram matching?

z_k	0	1	2	3	4	5	6	7
$v_k = G(z_k)$	0	0	0	1	2	5	6	7

A) 4 B) 2 C) 3 D) 1

19. Given the image below, what is the output intensity of the pixel at (3,2) after shrinking the histogram to the range [100, 200]?

180	80	140	200
40	100	160	220
60	120	20	240
80	140	200	253

A) 109 B) 143 C) 142 D) 120

20. Given the histogram of the 3-bit grayscale image of size 10 X10 below, how many pixels have the equalized gray level 6?

r_k	0	1	2	3	4	5	6	7
n_k	15	20	25	10	10	8	7	5

A) 7 B) 8 C) 18 D) 10

Write down the right answer (A , B , C , or D) in this table									
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

Best Wishes

Dr. Rasha M. Kamel

	Assiut University- Faculty of Science **Second Semester- Final Exam 2025-2026** **Mathematics Department**		**Program: Computer Science** **Level: (3)** **Date: 24/5/2026** **Time: 2 h**
Course Title: Introduction to Scientific Computations			**Code: 356 MC**
Instructors: Dr. Sayed A. Dahy			
Important:	**No. of pages 2**	**No. Of questions 6**	**Total Mark: 50 degrees**

Answer the Following Questions: **(This exam consists of 2 pages)**

Question 1: Give a MATLAB function to solve the non-linear algebraic equation $x - \cos x - 2 = 0$ around $x_0 = 1$ using the **Newton Raphson** method within $tol = 10^{-4}$.

a. Evaluate the exact solution via Command Window using MATLAB toolbox functions.
b. What is the condition must be satisfied for the method to converge?
c. Based on the MATLAB function fixed point, identify the stopping condition used.

Question 2: Give a MATLAB function to approximate $\int_1^2 \sqrt{4 + \sin x}\, dx$ using the **3/8 Simpson's** rule within $n = 18$.

a. Evaluate the exact value of the integral via Command Window using MATLAB toolbox functions.
b. Write the mathematical form of estimating the absolute error.
c. Which method do you think gives a more accurate result: the Simpson's 1/3 or Simpson's 3/8 rule?

Question 3: Give a **flowchart** explaining how to interpolate $y_{App}(2)$ of the following data Using **Lagrange** method.

x	1	3	4
y	22	18	11

a. Apply the algorithm to find Lagrange coefficients L_0, L_1 and L_2.
b. Evaluate the value of $y_{App}(2)$,
c. Evaluate the absolute error, suppose that $y_{Exact}(2) = 21.664$.

Question 4: Provide a **pseudocode** to solve the non-linear algebraic equation $\sqrt{x} - 2x + 3 = 0$ in [2,3] using the **False-position** method within $tol = 10^{-3}$.

a. Evaluate the exact solution via Command Window using MATLAB toolbox functions.
b. What is the stoppage criterion of the Bisection method?
c. Find c_1, and $f(c_1)$.

Please Turn the Paper Over...

	Assiut University- Faculty of Science **Second Semester- Final Exam 2025-2026** **Mathematics Department**	**Program: Computer Science** **Level: (3)** **Date: 24/5/2026** **Time: 2 h**	
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c. Find c_1, and $f(c_1)$.

Please Turn the Paper Over...

Question 5: Choose the correct answer

1- Consider the function $\boldsymbol{Fixed\_Point(g, x0, tol)}$, the purpose of the line: **x1 = g(x0);** is .....

A	To calculate the function value at x_0	B	To estimate the root using the Newton-Raphson formula
C	To compute the error between iterations	D	To initialize the function

2- The Continue criterion of **Newton Raphson** algorithm given as

A	$abs(x_1 - x_0) < tol$	B	$abs(x_1 - x_0) == 0$	C	$abs(f(x_0)) < tol$	D	$abs(x_1 - x_0) > tol$

3- By applying the **Fixed-point** algorithm for $x_2 = 1.5921$ given $g(x) = (2x + 7)^{\frac{1}{5}}$, then x_4 =.....

A	1.5906	B	1.5921	C	1.6154	D	2

4- The mathematical form used to apply **1/3 Simison's** rule for three points x_0, x_1, x_2 is

A	$\int_{x_0}^{x_n} f(x)dx = \frac{h}{3}[f(x_0) + 4f(x_1) + f(x_2)]$	B	$\int_{x_0}^{x_n} f(x)dx = \frac{h}{3}[f(x_0) + 3f(x_1) + f(x_2)]$
C	$\int_{x_0}^{x_n} f(x)dx = \frac{3h}{8}[f(x_0) + 3f(x_1) + f(x_2)]$	D	$\int_{x_0}^{x_n} f(x)dx = \frac{3h}{8}[f(x_0) + 2f(x_1) + f(x_2)]$

5- Which of the following methods requires that the number $\boldsymbol{n}$ be a multiple of 3?

A	Trapezoidal rule	B	1/3 Simison's rule	C	3/8 Simison's rule	D	Riemann Integral rule

6- The **false position** point $\boldsymbol{c} = \frac{af(b) - bf(a)}{f(b) - f(a)}$, is equivalent to:

A	$\frac{bf(b) - af(a)}{f(b) - f(a)}$	B	$\frac{f(b) + f(a)}{f(b) - f(a)}$	C	$a - \left[\frac{b - a}{f(b) - f(a)}\right] f(a)$	D	$\frac{a + b}{2}$

7- The stoppage criterion of **Bisection** method is

A	$\left\|f(\frac{a+b}{2})\right\| < tol$	B	$\left\|f(\frac{a+b}{2})\right\| > tol$	C	$\left\|f(\frac{a+b}{2})\right\| < 0$	D	$\left\|f(\frac{a+b}{2})\right\| > 0$

8- **Newton–Raphson** method is more accurate than ..... method

A	Fixed Point method	B	False Position method	C	Bisection method	D	All the previous methods

End of Exam

Best Wishes Dr. ***Sayed A. Daby***

	Assiut University- Faculty of Science **Second Semester- Final Exam 2025-2026** **Mathematics Department**	**Program: Material Science** **Level : (3)** **Date: 4/6/2026** **Time: 2 hrs**	
Course Title: Mathematical and Statistical Packages			**Code: MC300**
Instructors: Dr. Amira Allam			
Important:	**No. of pages 6**	**No. Of questions 1**	**Total Mark:50 marks**

Question 1: Choose the correct answer in the BUBBLE SHEET (50 Marks)

1. **A workbook file may contain**

A) Many worksheets B) Only one cell C) Only charts D) Only formulas

2. **A cell is identified by:**

A) Column letter first, then row number B) Row number first, then column letter C) Formula bar only D) Sheet color only

3. **Which of the following is an arithmetic operator in Excel?**

A) <> B) * C) = D) >=

4. **Which operator has the highest priority in Excel calculations?**

A)Subtraction B) Addition C) Relational operators D) Parentheses

5. **When a referenced value changes, formula results in Excel:**

A) Update automatically B) Remain unchanged C) Are deleted D) Turn into text

6. The IF function syntax is:

A) =IF(condition, true, false) B) =IF(condition, false, true) C) =IF(condition) D) =IF(condition, true only)

7. Which of the following will check if a value is NOT greater than 100?

A) =NOT(A1>100) B) =A1<=100 C) =IF(A1<=100, 'Yes', 'No') D) All of the above

8. To count the number of students scoring above 50, use:

A) COUNT B) COUNTA C) COUNTIF D) SUMIF

9. **Relative cell references in a formula:**

A) Are automatically adjusted when copied B) Never change when copied C) Can only refer to dates D) Always contain two dollar signs

10. In B1 cell, the formula =A1 * $C$1, if the formula is copied to cell B2, what will the new formula be?

A) =A2 * $C$1 B) =A1 * $C$1 C) =A2 * C2 D) =A1 * C1

11. **If B2 contains 81.3, what is the result of =ROUND(B2,0)*10?**

A) 810 B) 813 C) 81 D) 800

12. Which formula rounds the average of C1:C10 to the nearest ten?

A)=ROUND(AVERAGE (C1:C10),10) B)=ROUND(AVERAGE (C1:C10),-1) C)=AVERAGE(ROUN D(C1:C10),-1) D)=ROUND(C1:C10,-1)

13. If A1:A4 contains 10, blank, 20, and 30, what does =AVERAGE(A1:A4) return?

A) 15 B) 20 C) 30 D) #DIV/0!

14. Which formula correctly counts how many cells in B5:B8 contain the letter H?

A)=COUNTIF(B5:B8,H) B)=COUNTIF(B5:B 8,"H") C)=COUNT(B5:B8,"H") D)=COUNTAIF(B5:B8,"H")

15. Which formula correctly counts values greater than 6 in the continuous range C5:D8?

A)=COUNTIF(C5:D8,"> 6") B)=COUNTI F(C5:D8,>6) C)=COUNTIF(C5:C8,D 5:D8,">6") D) =COUNT(C5:D8,">6")

16. Which formula correctly summarizes the number of courses for the college listed in A9, and can be copied down?

	A	B	C
1	Student	College	#Course Enrolled
2	Smith	BUS	3
3	Jones	ASC	2
4	Blue	BUS	2
5	Davis	ASC	3
6	Wolfe	ASC	4
7			
8	Total Courses by College		
9	ASC	9	
10	BUS	5	

A)=SUMIF(B2:B6,A9,C 2:C6) B)=SUMIF(B$ 2:B$6,A9,C$2: C$6) C)=SUMIF(A9,B$2:B$6,C$2 :C$6) D)=SUMIF(C$2:C$6,A9,B$2: B$6)

17. Which formula correctly calculates the average number of courses for the college listed in A9, and can be copied down?

	A	B	C
1	Student	College	#Course Enrolled
2	Smith	BUS	3
3	Jones	ASC	2
4	Blue	BUS	2
5	Davis	ASC	3
6	Wolfe	ASC	4
7			
8	Average # Course Taken		
9	ASC	3	
10	BUS	2.5	

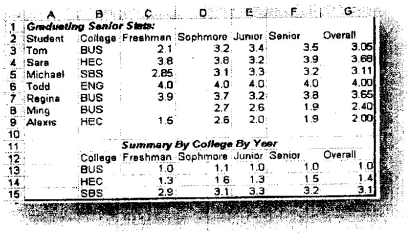
A)=AVERAGEIF(B$2:B$6,A9,C$2:C$6)

B)=AVERAGEIF(C$2:C$6,A9,B$2:B$6)

C)=AVERAGE(B$2:B$6,A9,C$2:C$6)

D)=COUNTIF(B$2:B$6,A9,C$2:C$6)

18. For a summary table by college and year, which formula is best to enter in C13 and copy down and across?



	A	B	C	D	E	F	G
1	*Graduating Senior Stats:*						
2	Student	College	Freshman	Sophmore	Junior	Senior	Overall
3	Tom	BUS	2.1	3.2	3.4	3.5	3.05
4	Sara	HEC	3.8	3.8	3.2	3.9	3.68
5	Michael	SBS	2.85	3.1	3.3	3.2	3.11
6	Todd	ENG	4.0	4.0	4.0	4.0	4.00
7	Regina	BUS	3.9	3.7	3.2	3.8	3.65
8	Ming	BUS		2.7	2.6	1.9	2.40
9	Alexis	HEC	1.6	2.6	2.0	1.9	2.00
10							
11			*Summary By College By Year*				
12		College	Freshman	Sophmore	Junior	Senior	Overall
13		BUS	1.0	1.1	1.0	1.0	1.0
14		HEC	1.3	1.6	1.3	1.5	1.4
15		SBS	2.9	3.1	3.3	3.2	3.1

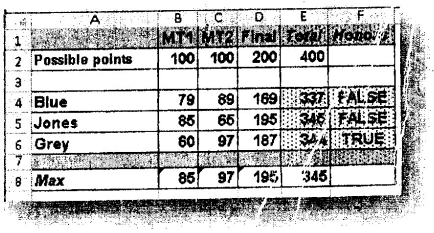
A)=AVERAGEIF(B3:B9,B13,C3:C9)

B)=AVERAGEIF($B$3:$B$9,$B13,C$3:C$9)

C)=AVERAGEIF($B13,$B$3:$B$9,C$3:C$9)

D)=SUMIF($B$3:$B$9,C$3:C$9,$B13)

19. Which formula checks whether Blue, Jones, and Grey all passed if the passing score is 320 and their totals are in E4:E6?



	A	B	C	D	E	F
1		MT1	MT2	Final	Total	Notes
2	Possible points	100	100	200	400	
3						
4	Blue	79	89	169	337	FALSE
5	Jones	85	65	195	345	FALSE
6	Grey	60	97	187	344	TRUE
7						
8	*Max*	85	97	195	345	

A)=OR(E4>=320,E5>=320,E6>=320)

B)=AND(E4>=320,E5>=320,E6>=320)

C)=COUNT(E4:E6>=320)

D)=NOT(E4:E6<320)

20. Which formula checks whether at least one student passed if the passing score is 320 and totals are in E4:E6?

A)=AND(E4>=320,E5>=320,E6>=320)

B)=OR(E4>=320,E5>=320,E6>=320)

C)=NOT(E4>=320)

D)=COUNTIF(E4:E6)

21. Which formula correctly means: Blue did not get a passing grade of 320 or above?

A)=NOT(E4>=320)

B)=AND(E4>=320)

C)=OR(E4>=320)

D)=E4>320

22. Which formula correctly checks that none of the students passed if G4:G6 contains TRUE/FALSE pass results?

A) =OR(G4:G6) B) =AND(G4:G6) C) =NOT(OR(G4:G6)) D) =NOT(AND(G4:G6))

23. Which formula correctly displays Pass if E4 is at least 300, otherwise Fail?

A)=IF("Pass",E4>=300," Fail") B)=IF(E4>=300,"Fail", "Pass") C)=IF(E4<300,"Pass","Fail") D)=IF(E4>=300,"Pass", "Fail")

24. If E4 contains 140, what is the result of =IF(E4<150,E4*1.1,E4)?

A) 160 B) 154 C) 150 D) 140

25. Which formula gives A for totals >=350, B for totals >=300, otherwise C?

A)=IF(E4>=350,"C",IF(E4 >=300,"B","A")) B)=IF(E4<350,"A",I F(E4<300,"B","C")) C)=IF(E4>=350,"A",IF (E4>=300,"B","C")) D)=IF(E4>=300,"B",IF(E4> =350,"A","C"))

26. Blue gets scholarship X if E4>340; otherwise, if D4>=160 he gets Y; otherwise none. Which formula is correct?

A)=IF(AND(E4>340,D4>= 160),"none","X") B)=IF(E4>340,"Y",IF(D 4>=160,"X","none")) C)=IF(E4>340,"X",IF(D 4>=160,"Y","none")) D)=IF(D4>=160,"Y",I F(E4>340,"X","none"))

27. Which formula checks whether Blue has the highest score in all three exams, assuming the maximum scores are in row 8?

A)=IF(MAX(B4:D4)=M AX(B8:D8),"A","") B)=IF(B4+C4+D4=B8+ C8+D8,"A","") C)=IF(AND(B4=B8,C4 =C8,D4=D8),"A","") D)=IF(OR(B4=B8,C4=C8 ,D4=D8),"A","")

28. The LOOKUP function returns:

A) the number of nonblank cells B) only an exact text match C) the greatest value that does not exceed the lookup value D) the smallest value greater than the lookup value

29. Which function is most suitable to average values that meet one criterion?

A) LOOKUP B) AVERAGEIF C) SUMIF D) COUNTIF

30. Which Excel add-in is required to access Descriptive Statistics, Histogram, t-Test, and Regression from the Data tab?

A) Developer Tools B) Power Pivot C) Analysis ToolPak D) Solver Add-in

31.Which of the following is NOT a view in SPSS?

A) Data View B) Variable View C) Output View D) Analysis View

32.In SPSS, what does each column in the Data View represent?

A) A variable B) A data set C) A case D) A graph

33. Which menu in SPSS includes commands for statistical analyses?

A) Edit B) Analyze C) Transform D) View

34.How can you add a new variable to the data in SPSS?

A) Use the Transform menu B) Use Insert Variable in the Data menu C) Use Analyze > Add Variable D) Use Compute Variable

35.Which variable type represents numbers like 111,214.5?

A) Numeric B) Comma C) Dot D) Scientific Notation

36. What is a relative reference in Excel?

A) A reference that remains constant B) A reference that adjusts when copied C) A reference to a cell in another workbook D) A reference that uses $ symbols

37. Which error occurs if a formula references a deleted cell?

A) #VALUE! B) #NAME? C) #REF! D) #NUM!

38. What is the correct variable type for recording names of cities?

A) Numeric B) String C) Comma D) Date

39. What menu option is used to sort data by gender in SPSS?

A) Analyze B) Data > Sort Cases C) View > Data Sorting D) File > Sort

40.What type of variable is used to record dates in SPSS?

A) Numeric B) Date C) String D) Scientific Notation

41. What does SPSS stand for?

A) Statistical Program for Social Science B) Statistical Package for the Social Sciences C) Statistics Programming System Software D) Statistical Processing and Software Science

42. What does each row in the Data View typically represent?

A) A variable B) A case C) A function D) A command

43. In Variable View, which column allows for longer descriptions of variable names?

A) Label B) Measure C) Values D) Type

44. What is the correct variable type for recording names of cities?

A) Numeric B) String C) Comma D) Date

45. What is the function of the 'Align' column in Variable View?

A) Allows sorting of variables | B) Determines the alignment of data in a column | C) Changes the type of variable | D) Allows assigning labels

46. What type of measurement is plant height categorized as 'short' or 'tall'?

A) Nominal | B) Ordinal | C) Scale | D) Interval

47. What is the first column in Variable View called?

A) Name | B) Label | C) Values | D) Type

48. What type of variable uses a scale like '1 to 10cm' or '10 to 20cm'?

A) Nominal | B) Ordinal | C) Scale | D) Interval

49. In SPSS, how do you select only male-administered data?

A) Data > Select Case | B) Analyze > Filter Cases | C) Transform > Select Data | D) View > Select Data

50. How do you compute a new variable in SPSS?

A) Go to Compute Variable in the Data menu | B) Use Compute Variable under Transform | C) Use Analyze > Compute | D) Go to File > Add Variable

End of Exam

Best Wishes Dr. Amira Allam

	Assiut University- Faculty of Science **Second Semester- Final Exam 2025-2026** **Mathematics Department**	**Program: Mathematics** **Level : (3)** **Date: 3/6/2026** **Time: 2 h**	
Course Title: Mathematical Foundations of Quantum Mechanics and Statistical Mechanics (1)			**Code: M331**
Instructors: Dr. Esraa Gamal			
Important:	**No. of pages 4**	**No. Of questions 7**	**Total Mark:50 degree**

Question No. 1 : (10 marks) Choose the correct answer in the following statements: (1 mark each)

Q 1 :- Δ The condition for stable paths (stationary states) of a periodic dynamical system with canonical coordinates p_α , q_α satisfying $\oint p_\alpha dq_\alpha = n_\alpha h$ is:

(A) Planck's hypothesis **(B)** One of Bohr's postulates
(C) The Compton effect **(D)** The Wilson–Sommerfeld rule

Q 2 :- ■ Which of the following is a de Broglie relation?

(A) $E = \hbar\omega$ **(B)** $E = h\omega$ **(C)** $E = \hbar\nu^2$ **(D)** $E = \hbar\nu$

Q 3 :- • Using the definition of statistical weight and Stirling's approximation, the entropy is given by:

(A) $S = k[2N \ln N - N_k \ln N_k]$ **(B)** $S = k[N \ln N - \ln N_k]$
(C) $S = k[N! \ln N! - N_k \ln N_k]$ **(D)** $S = k[N \ln N - N_k \ln N_k]$

Q 4 :- • If the pressure of a gas is given by $P = BT^2$ where B is a constant, its thermal expansion coefficient equals:

(A) B^2T **(B)** T^2 **(C)** 2TB **(D)** 2T

Q 5 :- ■ In isometric (constant-volume) processes, the relation between internal energy and heat absorbed is:

(A) $dU = dQ$ **(B)** $dU < dQ$ **(C)** $dU > dQ$ **(D)** $dQ \neq dU$

Q 6 :- ■ Which of the following statistical distributions best describes the behaviour of an ideal gas?

(A) Poisson distribution **(B)** Boltzmann distribution
(C) Bernoulli distribution **(D)** Geometric distribution

Q 7 :- • A gas obeys the Clausius equation $P(V-b) = RT$. Its thermal expansion coefficient is:

(A) $(V-b) / (RTV)$ **(B)** $(V-b) / (TV)$
(C) $(V-b)^2 / (RTV)$ **(D)** No correct answer

Q 8 :- ■ Elementary particles and electromagnetic waves with spin angular momentum 0 or 1 obey:

(A) Fermi–Dirac statistics **(B)** Maxwell statistics

(C) Bose–Einstein statistics **(D)** Gibbs statistics

Q 9 :- ◊ Which of the following is NOT a Maxwell relation?

(A) $(\partial V/\partial T) = -(\partial S/\partial P)$ **(B)** $(\partial T/\partial P) = -(\partial V/\partial S)$

(C) $(\partial P/\partial T) = (\partial S/\partial V)$ **(D)** $(\partial T/\partial V) = -(\partial P/\partial S)$

Q 10 :- Δ The combined equation of the First and Second Laws of Thermodynamics is:

(A) $dU = TdS - VdP$ **(B)** $TdS = dU + PdV$

(C) $dQ = TdS$ **(D)** $dU = TdS$

Question No. 2 : (10 marks)

Put mark (✓) in front of the correct statement and mark (✗) in front of the incorrect one:

(1 mark each)

(1) ■ The following equation $\nabla^2 S = \frac{1}{u^2}\frac{\partial^2 S}{\partial t^2}$ is the equation of geometric optics. ( )

(2) Δ Quantum mechanics is the theory concerned with studying bodies that move at the speed of light. ( )

(3) • The function $\psi(x) = e^{|x|}, -\infty < x < \infty$ represents a wave function. ( )

(4) ■ The kinetic energy operator T in quantum mechanics is $-\frac{\hbar^2}{2m}\frac{\partial^2}{\partial x^2}$. ( )

(5) Δ Heisenberg's uncertainty principle states that $\sqrt{\langle \Delta x^2 \rangle}\sqrt{\langle \Delta p^2 \rangle} \geq \frac{1}{2}\hbar$. ( )

(6) • If $E < V_o$, the particle will completely cross the potential barrier and continue moving to the right indefinitely. ( )

(7) Δ The Second Law of Thermodynamics states that the total entropy of an isolated system increases with time. ( )

(8) ■ For particles that obey the Pauli exclusion principle, we use the Fermi–Dirac distribution. ( )

(9) • The Gibbs free energy can be computed from the mathematical relation $G = H + TS$. ( )

(10) ■ The thermal content (enthalpy) of a substance is the sum of its internal energy and the product of pressure and volume. ( )

Answer only Three of the following questions.

Question No. 3 : (10 marks)

(a) Δ State the three fundamental postulates of quantum mechanics. In particular, explain the role of the wave function $\Psi(x,t)$ and its probabilistic interpretation (Born postulate).

(b) • A particle is confined in an infinite square well of width L (V(x) = 0 for 0 < x < L, V = ∞ elsewhere). Write the time-independent Schrödinger equation, solve it to obtain the normalized wave functions $\Psi_n(x)$ and the corresponding energy eigenvalues E_n. Then calculate the probability of finding the particle in the interval 0 < x < L/3 for the ground state (n = 1).

(c) ◊ Derive the Wilson–Sommerfeld quantization rule and apply it to a particle of mass m executing simple harmonic motion with angular frequency ω to show that the allowed energy levels are $E_n = nhv\ (n = 1, 2, 3, \ldots)$.

Question No. 4 : (10 marks)

(a) •◊ In orthogonal curvilinear coordinates $(q1, q2, q3)$ with scale factors $(h1, h2, h3)$, write down the general expression for the Laplacian $\nabla^2\Psi$. Then apply it to cylindrical coordinates (ρ, ϕ, z) with the known scale factors to derive the explicit form of the Schrödinger equation in cylindrical coordinates for a free particle.

(b) ◯ * Design a quantum system whose symmetry makes cylindrical coordinates preferable to Cartesian coordinates. Formulate the corresponding Schrödinger equation, separate the variables, and discuss how the resulting equations differ from those obtained in Cartesian coordinates.

Question No. 5 : (10 marks)

(a) Δ Write the explicit quantum-mechanical operator for the x-component of angular momentum $\boldsymbol{L_x}$ in Cartesian coordinates. Then compute the following commutators: $[\boldsymbol{x}, \boldsymbol{P_x}]$ ،$[\boldsymbol{x}, \boldsymbol{L_x}]$ ، $[\boldsymbol{y}, \boldsymbol{L_x}]$ $[\boldsymbol{P_x}, \boldsymbol{L_x}]$.

(b) •◊ The rotation gate about the x-axis is given by $\boldsymbol{R_x(\theta)} = \begin{pmatrix} \cos\frac{\theta}{2} & -i\sin\frac{\theta}{2} \\ -i\sin\frac{\theta}{2} & \cos\frac{\theta}{2} \end{pmatrix}$. Apply a rotation of θ = π/3 about the x-axis to the qubit state |1⟩. Write your answer in the computational basis {|0⟩, |1⟩} and calculate the probabilities of measuring |0⟩ and |1⟩.

(c) * ◯ A CNOT gate acts on two qubits A (control) and B (target). Construct the full truth table for all input combinations of A and B, showing outputs A′ and B′. Also, design a two-qubit quantum circuit using a CNOT gate and at least one additional quantum gate to generate an entangled state. Construct the truth table, determine the final quantum state, and discuss its measurement outcomes.

Question No. 6 : (10 marks)

(a) • The Gibbs free energy of a thermodynamic system is given by $\boldsymbol{G = RTln\left(\frac{P}{P_o}\right) + P\sqrt{T}}$, where $\boldsymbol{R}$ and $\boldsymbol{P_o}$ are constants. (i) Derive expressions for the entropy S and the volume V of the system. (ii) Determine whether the entropy increases or decreases with increasing pressure at high temperatures. Justify your answer mathematically.

(b) •◊ A gas obeys the equation of state $\boldsymbol{P = \frac{RT}{V-b} - \frac{a}{V\sqrt{T}(V+b)}}$, where a, b, R are constants. Compute the partial derivatives $\left(\frac{\partial P}{\partial V}\right)_T, \left(\frac{\partial P}{\partial T}\right)_V$ and $\left(\frac{\partial V}{\partial T}\right)_P$.Then verify that dP is an exact differential (i.e., P is a state function) by checking the appropriate Maxwell-like cross-derivative condition.

Question No. 7 : (10 marks)

(a) * Prove the cyclic relation: $\boldsymbol{(\frac{\partial P}{\partial V})_T(\frac{\partial V}{\partial T})_P(\frac{\partial T}{\partial P})_V = -1}$. Explain physically what this identity means for a single-component thermodynamic system.

(b) •◊ The Helmholtz free energy of a thermodynamic system is given by $\boldsymbol{F(V,T) = AT^2 ln\frac{V}{B}}$, where A and B are positive constants. (i) Derive expressions for the pressure P, entropy S. (ii) Use P and S to compute the internal energy U and the enthalpy H. (iii) Verify your result for U by direct application of the thermodynamic identity dU = TdS - PdV.

End of Exam **Best Wishes**

Dr. Esraa Gamal

Faculty of Science	**Image Processing – 3rd Level**	
Assiut University	**2 Hours**	
2nd Semester 2026	**50 Marks**	

Question 1: Determine whether these statements are true (T) or false (F) (10 Points)

1. A digital image can be considered as a discrete representation of data that possess spatial and intensity information.
2. The effectiveness of digital image processing operations depends mainly on user expertise.
3. The choice of noise removal technique depends mainly on the noise characteristics present in the image.
4. The total number of bites required to store 5X5 image with 64 gray levels is 1600 bits.
5. Given the result of subtracting two images, the original images can always be perfectly recovered.
6. Converting a grayscale image to a binary image results in loss of information while reducing computational complexity.
7. Image subtraction is commonly used in video processing to detect motion between consecutive frames.
8. In grayscale conversion, the red, green, and blue channels contribute equally when computing pixel intensity.
9. JPEG is the preferred image format for archiving medical scans because it preserves all image information.
10. The main drawback of the absolute difference operation is that it loses information about which image contains the brighter pixel.

Write down the right answer (T or F) in this table									
1	2	3	4	5	6	7	8	9	10

Question 2: Choose the correct answer (40 Points)

1. Which image processing operation intentionally smooths an image and reduces fine details?

A) Sharpening B) Blurring C) Segmentation D) Contrast Enhancement

2. Given the normalized grayscale image I below, how many pixels will be assigned the value 1 (white) after applying im2bw(I,0.5)?

0.2	0.8	1
0.6	0.3	0.5
0.4	0.7	0.9

A) 3 B) 5 C) 6 D) 9

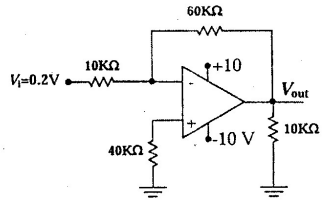


Figure 1

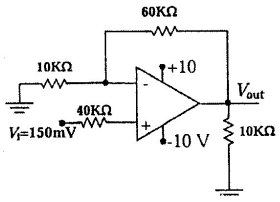


Figure 2

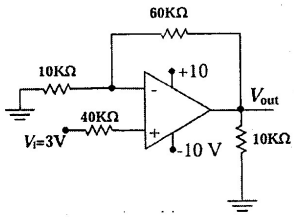


Figure 3

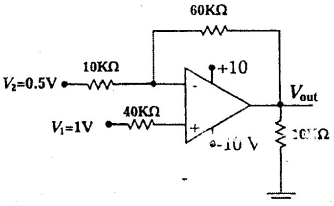


Figure 4

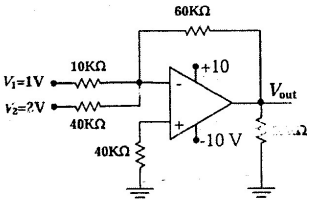


Figure 5

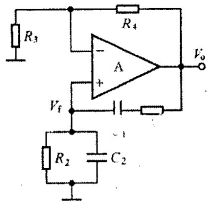


Figure 6

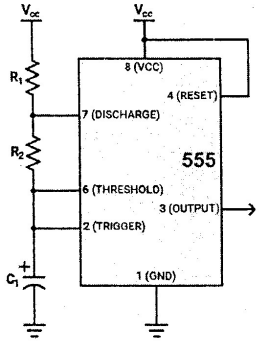


Figure 7

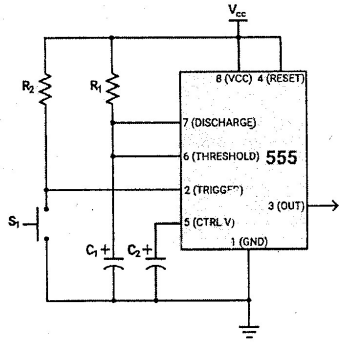


Figure 8

Q2.a) (5points) Complete the following truth table considering the circuit in Fig. 9.

A	B	X	Y
0	0		
0	1		
1	0		
1	1		

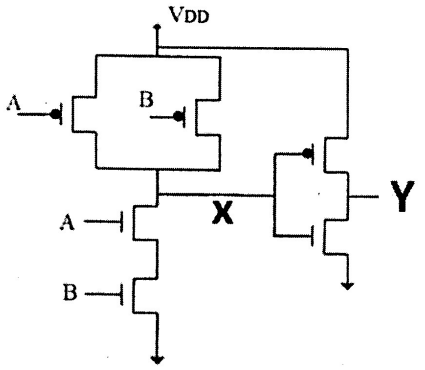


Fig. 9

What functions are implemented by the outputs X and Y?

Q2.b) (5 Points) For the op-amp differentiator in Fig.10.a

a) (2 points) Derive an expression for the output voltage vo(t)
b) Sketch vo(t) for t ≥0 for the input voltage given in Fig.10.b. Take vo=0 at t =0.

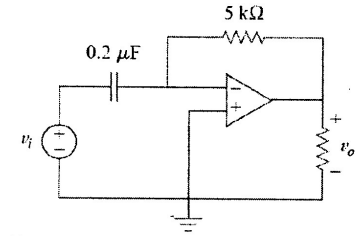


Fig. 10.a

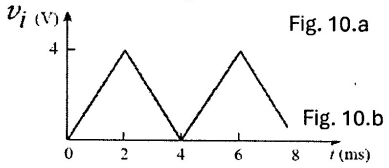


Fig. 10.b

Q3) (10 points) The circuit of Figure 11 is designed for a collector current of 1.02 mA. Assume $I_S = 8 \times 10^{-16}$ A, $\beta = 100$, and $V_A = \infty$. C_B is very large.

Calculate the following:

a) The remaining bias point parameters: V_{CE}, V_{BE}, and I_B.
b) The small-signal model parameters g_m, r_π, and r_o.
c) Determine the required value of R_1.
d) Sketch the small-signal model.
e) Derive expressions for the voltage gain, input impedance, and output impedance.

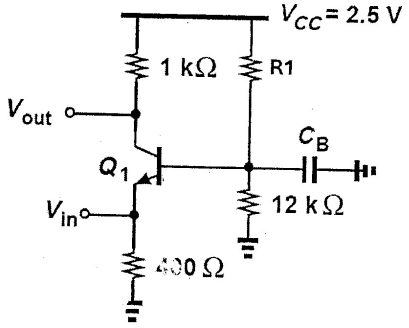


Figure 11.

Q4) (10 Points) It is required to design the common-source amplifier in Fig. 12 to achieve the following specifications:

- Voltage gain of 5V/V
- Output impedance of 0.25kΩ
- Input impedance 50kΩ
- Drain Current of 2.5mA
- Gate voltage V_G = 1.15V.

Assume R_G=0, $\mu_n C_{ox}$ = 100 μA/V², V_{TH} = 0.5V, λ = 0, and V_{DD}=1.8V.

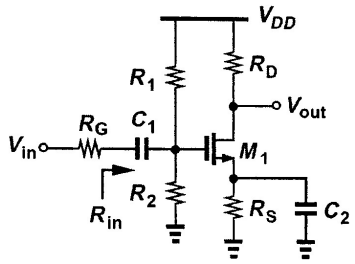


Figure 12.

Choose the correct answer and put your selection in the table below.

Statement	1	2	3	4	5	6	7	8	9	10
Answer										

1. To be used as in the amplifier circuit, M_1 must be biased in the ..... region.
   a) Active b) saturation c) triode d) cutoff
2. The capacitor C_1 is a..... capacitor while C_2 is a..... capacitor.
   a) bypass, coupling b) bypass, bypass c) coupling, bypass d) coupling, coupling.
3. To achieve the required output impedance, R_D must be set to .....
   a) 50kΩ b) 5kΩ c) 0.5kΩ d) 0.25kΩ
4. To achieve the required gain, the transistor M_1 must provide a transconductance g_m of .....
   a) 50mS b) 40mS c) 30mS d) 20mS
5. The obtained transconductance g_m along with the drain current requirements result in a V_{GS} of .....
   a) 0V b) 0.25V c) 0.5V d) 0.75V
6. Considering the drain current requirements and the calculated V_{GS}, the aspect ratio of the transistor must be set to W/L = ...
   a) 600 b) 700 c) 800 d) 1000
7. To satisfy the conditions on the gate voltage V_G the input impedance, the voltage divider resistors must be set to R_1=..... and R_2=....., respectively.
   a) 78.3 kΩ and 138.5 kΩ b) R_1=R_2=78.5 kΩ c) R_1=R_2=138.5 kΩ d) 138.5 kΩ and 78.5kΩ
8. With the given value of V_G and the calculated value of V_{GS}, the DC voltage drop across R_S is calculated as .....
   a) 0.4V b) 0.45V c) 0.5V d) 0.75V
9. The DC voltage drop across R_S calculated in the above point leads to an R_S of .....
   a) 160Ω b) 200Ω c) 260Ω d) 360Ω
10. A two-stage amplifier is constructed by cascading two identical stages of the circuit in Fig. 11. Capacitive coupling is employed between stages. The second stage drives a capacitively-coupled load equals to R_D. The overall gain of the two-stage amplifier becomes .....V/V
    a) 5 b) 10 c) 12.5 d) 25

	Assiut University- Faculty of Science Frist Semester- Final Exam 2025-2026 Mathematic Department	Level : (3) Date: 30/12/2025 Time: 3 h	
Course Title: Operation Research (1)		Code: 326 Math	
Instructors: Prof. Dr. Mostafa Ali El khateb			
Important:	No. of pages 2	No. Of questions 5	Total Mark:50 degree

Solve the Questions:

1) The petrochemicals company produces three products are x_1 , x_2 , x_3 There are three stages the production process in three stages as shown in the table

stages	x_1	x_2	x_3	Time of minutes
Stage 1	3	2	4	80
Stage 2	1	5	1	70
Stage 3	5	4	6	90
Z	3	4	2	

The first stage time is 80 minutes and second 70 minutes and third 90 minutes . The profits of every unit x_1 , x_2 , x_3 is 3 , 4 , 2 writ the model of the linear programming which achieves the highest profit .and solve the model by the Algebraic method

2) (a) To find the optimal solution of Model of linear programming the next by the Graphical Method

Max $Z = 40x_1 + 50x_1$

S.t $x_1 + 2x_2 \leq 8$, $3x_1 + x_2 \leq 9$, $x_1, x_2 \geq 0$

(b) Writ dual of following liner problem

$Min \quad z = 4x_1 + x_2$

S.t $3x_1 + x_2 = 3$ $4x_1 + 3x_2 \geq 6$ $x_1 + 2x_2 \leq 3$ $x_1, x_2 \geq 0$

3) Solution of this model by Simplex method

$Min \quad z = 40x_1 + 90x_2$

$S.t \quad 4x_1 + 2x_2 \geq 5$, $x_1 + 3x_2 \geq 4$, $x_1, x_2 \geq 0$

4) (a) solution of this model by Simplex method this problem and find solution of dual linear problem form the solution.

$Max \quad z = 2x_1 + 5x_2$

S.t $\quad 3x_1 + 5x_2 \leq 8 \quad , \quad 2x_1 + 7x_2 \leq 12 \quad , \quad x_1, x_2 \geq 0$

(b) find the first table of big – M Simplex method this problem

$Min \quad z = 2x_1 + 3x_2$

S.t $\quad -2x_1 + 3x_2 = 3 \quad 4x_1 + 5x_2 \geq 10 , \quad x_1 + 2x_2 \leq 5 \quad , \quad x_1, x_2 \geq 0$

5) If the solution of this model by Simplex method this problem

Max $\quad z = 16x_1 + 20x_2$

S.t $\quad 5x_1 + 4x_2 \leq 40 \qquad\qquad 3x_1 + 6x_2 \leq 50$

$x_1, x_2 \geq 0$

Basic variable	x_1	x_2	S_1	S_2	solation
x_1	1	0	1/3	– 2/9	20/9
x_2	0	0	– 5/6	5/18	65/9
z	0	0	2	– 2/3	180

Discuss sensitivity Analysis

End of Exam

Best Wishes

Prof. Dr. Mostafa El kahteeb
Prof. Dr. Taha El Gindy

	Assiut University- Faculty of Science Frist Semester- Final Exam 2025-2026 Mathematics Department	Program: Material Science Level : (3) Date: 30/12/2025 Time: 2 hrs	
Course Title: Mathematical and Statistical Packages			Code: MC300
Instructors: Dr. Amira Allam			
Important:	No. of pages 5	No. Of questions 4	Total Mark:50 degree

Question 1: Choose the correct answer, put the answers in the table (30 Marks)

1. A spreadsheet in Excel is referred to as:

A) Workbook B) Worksheet C) Database D) Template

2. Which of the following is an example of an arithmetic operator in Excel?

A) ^ B) & C) @ D) %

3. To count only numeric entries in a range, use:

A) COUNTA B) COUNT C) COUNTIF D) AVERAGE

4. What does the error #DIV/0! mean?

A) A value is divided by zero. B) A reference is invalid. C) The formula is too complex. D) Text is entered in a numeric cell.

5. The formula =ROUND(23.456, 2) returns:

A) 23 B) 23.46 C) 23.45 D) 23.5

6. The IF function syntax is:

A) =IF(condition, true, false) B) =IF(condition, false, true) C) =IF(condition) D) =IF(condition, true only)

7. Which of the following will check if a value is NOT greater than 100?

A) =NOT(A1>100) B) =A1<=100 C) =IF(A1<=100, 'Yes', 'No') D) All of the above

8. To count the number of students scoring above 50, use:

A) COUNT B) COUNTA C) COUNTIF D) SUMIF

9. Which of the following is a mixed cell reference?

A) $A$1 B) A1 C) A$1 D) $A1$

10. In B1 cell, the formula =A1 * $C$1, if the formula is copied to cell B2, what will the new formula be?

A) =A2 * $C$1 B) =A1 * $C$1 C) =A2 * C2 D) =A1 * C1

11. Which of the following is NOT a view in SPSS?

4. Write a formula in cell I4 to determine if Blue got a B. To get a B Blue needs to have a total score higher than the class average - otherwise he gets a C.

Question 3: for the following table Write the following Boolean functions (5 marks)

	A	B	C	D	E	F	G
1		MT1	MT2	Final	Total	Honors	Passed
2	Possible points	100	100	200	400		320
3							
4	Blue	79	89	169	337	FALSE	TRUE
5	Jones	85	65	195	345	FALSE	TRUE
6	Grey	60	97	187	344	TRUE	TRUE
7	Mary	10	30	50	90	TRUE	FALSE
8							

1. Blue's total and Jones' total are greater than Grey's.

2. Grey's total is not the maximum grade

3. None of the students passed the course

4. Write a formula in cell I4 to determine if Blue got a B. To get a B Blue needs to have a total score higher than the class average - otherwise he gets a C.

Question 3: for the following table Write the following Boolean functions (5 marks)

	A	B	C	D	E	F	G
1		MT1	MT2	Final	Total	Honors	Passed
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3							
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5	Jones	85	65	195	345	FALSE	TRUE
6	Grey	60	97	187	344	TRUE	TRUE
7	Mary	10	30	50	90	TRUE	FALSE
8							

1. Blue's total and Jones' total are greater than Grey's.

2. Grey's total is not the maximum grade

3. None of the students passed the course

A) Data View B) Variable View C) Output View D) Analysis View

12.In SPSS, what does each column in the Data View represent?

A) A variable B) A data set C) A case D) A graph

13. Which menu in SPSS includes commands for statistical analyses?

A) Edit B) Analyze C) Transform D) View

14.How can you add a new variable to the data in SPSS?

A) Use the Transform menu B) Use Insert Variable in the Data menu C) Use Analyze > Add Variable D) Use Compute Variable

15.Which variable type represents numbers like 111,214.5?

A) Numeric B) Comma C) Dot D) Scientific Notation

16. What is a relative reference in Excel?

A) A reference that remains constant B) A reference that adjusts when copied C) A reference to a cell in another workbook D) A reference that uses $ symbols

17. Which error occurs if a formula references a deleted cell?

A) #VALUE! B) #NAME? C) #REF! D) #NUM!

18. What is the correct variable type for recording names of cities?

A) Numeric B) String C) Comma D) Date

19. What menu option is used to sort data by gender in SPSS?

A) Analyze B) Data > Sort Cases C) View > Data Sorting D) File > Sort

20. What type of variable is used to record dates in SPSS?

A) Numeric B) Date C) String D) Scientific Notation

Q	1	2	3	4	5	6	7	8	9	10
A										
Q	11	12	13	14	15	16	17	18	19	20
A										

Question 2 for the following table answer the questions (10 marks)

	A	B	C	D	E
1		MT1	MT2	Final	Total
2	Possible points	100	100	200	400
3					
4	Blue	79	89	169	337
5	Jones	85	65	195	345
6	Grey	60	97	187	344
7					
8	*Max*	85	97	195	345

1. Write a formula in cell F4 to determine if Blue passed or failed (a minimum of 300 points is required to pass) .

2. Write a formula in cell G4 to determine Blue's curved grade. If the grade is below 150 add 10%, if the grade is 150 or above the grade remains the same .

3. Write a formula in cell H4 to determine if Blue got an A - to get an A Blue need to have the highest score on all 3 exams .

Question 4 :for the following table Write the following Boolean functions (5 marks)

	A	B	C	D	E	F	G
1	***Graduating Senior Stats:***						
2	Student	College	Freshman	Sophmore	Junior	Senior	Overall
3	Tom	BUS	2.1	3.2	3.4	3.5	3.05
4	Sara	HEC	3.8	3.8	3.2	3.9	3.68
5	Michael	SBS	2.85	3.1	3.3	3.2	3.11
6	Todd	ENG	4.0	4.0	4.0	4.0	4.00
7	Regina	BUS	3.9	3.7	3.2	3.8	3.65
8	Ming	BUS		2.7	2.6	1.9	2.40
9	Alexis	HEC	1.5	2.6	2.0	1.9	2.00
10							
11			***Summary By College By Year***				
12		College	Freshman	Sophmore	Junior	Senior	Overall
13		BUS	1.0	1.1	1.0	1.0	1.0
14		HEC	1.3	1.6	1.3	1.5	1.4
15		SBS	2.9	3.1	3.3	3.2	3.1

In cell C13 calculate the average sum for students by college by year copied down the column and across the row to complete the other values.

End of Exam

Best Wishes Dr. Amira Allam

	Assiut University- Faculty of Science **Frist Semester- Midterm Exam 2025-2026** **Mathematics Department**	**Program: Computer Science** **Level: (3)** **Date: 26/12/2025** **Time: 2 h**	
Course Title: قواعد البيانات رك ٣٥٧			
Instructors: Dr. Marwa Hussien Mohamed			
Important:	**No. of pages 7**	**No. Of questions 50**	**Total Mark: 50 degree**

1. Choose the Correct Answer: (50 Marks)

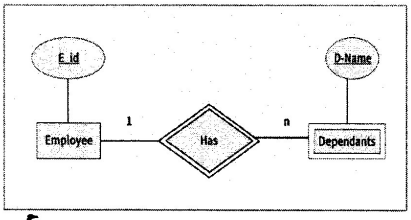
1. The "As" clause is used to … in the returned query result
   a) Copy a column
   b) Rename a column
   c) Update a column
   d) Select a column

2. In which of the following relationship types, is a single entity instance of one entity type related to only one instance of another entity type?
   a) one to one relationship
   b) one to many relationship
   c) many to many relationship
   d) Composite relationship

3. To display Students' names whose age are more than or equal to 21, we write the following SQL Query?
   a) select Name from Student S where S.Age >21;
   b) select Name from Student S where S.Age <21;
   c) select Name from Student S where S.Age >=21;
   d) select Name from Student S where S.Age <=21;

4. The ----- constraint is used to ensure that every value in a particular column has a different value.
   a) Not Null
   b) Check
   c) Unique
   d) Default

5. The "has" relationship in this Figure:
   a) must be total on the "Employee" entity side
   b) must be total on the "Dependent" entity side
   c) Both are correct
   d) None is correct

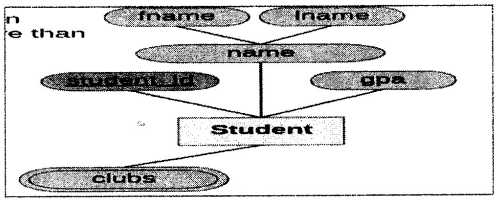


6. Which of the following commands are used to determine the number of rows returned from a query?
   a) Group by
   b) Like
   c) Where
   d) Limit

7. Which SQL Query is used to remove a table and all its data from the database?
   a) Delete From table table-name
   b) Alter table table-name
   c) Drop table table-name
   d) All are correct

8. Mapping the entity "Student" into relational model, there will be another table called "Student_Name" which has the following attributes: Student_Name(Student_id, Fname, Lname)?

a) True
b) False



9. Find the ages of students from the Student table who are living in Asyut or Cairo and their degrees are more than or equal to 60.

a) SELECT age FROM Student WHERE (city = 'Asyut' AND city = 'Cairo') OR degree <= 60;
b) SELECT age FROM Student WHERE (city = 'Asyut' OR city = 'Cairo') OR degree >= 60;
c) SELECT age FROM Student WHERE (city = 'Asyut' OR 'Cairo') AND degree > 60;
d) SELECT age FROM Student WHERE (city = 'Asyut' OR city = 'Cairo') AND degree >= 60

10. Which command would you use to add a new column to an existing table?

a) ADD COLUMN TO table_name
b) UPDATE TABLE ADD column_name
c) ALTER TABLE table_name ADD column_name datatype
d) Create TABLE table_name ADD column_name

11. How do you rename a table in MySQL?

a) ALTER TABLE old_name TO new_name
b) MODIFY TABLE old_name TO new_name
c) CREATE table old_name TO new_name
d) ALTER TABLE old_name RENAME TO new_name

12. Which statement adds a NOT NULL constraint to the "Name" column?

a) ALTER TABLE emp MODIFY Name VARCHAR(50) NOT NULL;
b) ALTER TABLE emp ADD NOT NULL Name
c) UPDATE emp SET Name NOT NULL;
d) ALTER TABLE emp CONSTRAINT Name NOT NULL;

Consider the Employee table to answer the questions from 13 to 17:

EmpID	Name	Dept	Salary
1	Ahmed	HR	5000
2	Sara	IT	7000
3	Ali	IT	7000
4	Mona	HR	6000
5	Tarek		4500

13. SELECT Count (Dept) FROM Employee; What will this query return?

a) 5
b) 2
c) 4
d) 1

14. SELECT Name FROM Employees WHERE Salary = (SELECT MAX(Salary) FROM Employees); What will this query return?
   a) Sara
   b) Sara and Ali
   c) Tarek
   d) All Employees

15. SELECT COUNT(*) FROM Employees WHERE Dept = 'IT' AND Salary > 6000; The query returns …
   a) 0
   b) 1
   c) 2
   d) 3

16. SELECT Name FROM Employee WHERE Dept IS NOT NULL ORDER BY Salary DESC; What will this query be returned?
   a) Tarek
   b) Sara, Ali, Mona, Ahmed
   c) Ahmed, Sara, Ali, Mona
   d) Ahmed, Mona , Ali, Sara

17. SELECT Count(EMPID) FROM Employee WHERE Salary BETWEEN 5000 AND 7000; What will this query return?
   a) 1
   b) 2
   c) 4
   d) 5

18. What does a PRIMARY KEY constraint do?
   a) Prevents duplicate rows
   b) Ensures the column doesn't have null values
   c) Uniquely identify each row in a table
   d) All of the above

19. Which statement is used to get all data from the student table whose name contains letter 'd'?
   a) SELECT * FROM student WHERE name LIKE '%d';
   b) SELECT * FROM student WHERE name LIKE '%d%';
   c) SELECT * FROM student WHERE name LIKE 'd%';
   d) SELECT * FROM student WHERE name LIKE '%_d';

20. Properties that describe the characteristics of entities are called _____
   a) Attributes
   b) Entities
   c) Relationships
   d) Identifiers

21. For the following two ENTITIES, which is the appropriate relationship: Student / Graduation_Project?
   a) 1:1
   b) 1:M
   c) M:N
   d) None of the above

22. In ER diagram derived attributes are denoted by:
    a) Dotted rectangle
    b) Dotted oval
    c) Double oval
    d) Double rectangle

23. An entity is _____.
    a) has cardinality (1:1, 1:N, or M:N)
    b) the association between two related entities
    c) described with a verb phrase
    d) a representation of a person, place or thing

24. The GPA can be considered as _____
    a) Primary Attribute
    b) Derived Attribute
    c) Composite Attribute
    d) Multivalued Attribute

25. An attribute in a relation of a database that serves as the primary key of another relation in the same database is called a:
    a) simple attribute
    b) composite attribute
    c) Foreign key
    d) multivalued attribute

26. What is a database?
    a) A software to allow drawing ERD models
    b) A piece of software to do calculations
    c) A device to load information onto the computer
    d) A structured and related collection of data

27. The relationship that represent the Courses and the Pre-requisite Courses is _____
    a) Binary relationship.
    b) Recursive relationship
    c) N-ary relationship.
    d) 1:1 relationship

28. For the following two ENTITIES, which is the appropriate relationship: Doctor / Manager of department?
    a) 1:1
    b) 1:M
    c) M:N
    d) None of the above

29. Which of the following cannot be a multivalued attribute?
    a) First_name
    b) Phone_No
    c) Hobby
    d) Address

30. E-R model uses which symbol for Weak entity?
   a) Double rectangle
   b) Double diamond
   c) Dotted rectangle
   d) Dotted oval

31. Which of the following statements is correct to display all information about the employees whose salaries are in the range of 1000 to 5000 from the 'Employee' table?
   a) SELECT * FROM employee WHERE salary IN (1000, 5000);
   b) SELECT * FROM employee WHERE salary between 1001 and 4999;
   c) SELECT * FROM employee WHERE salary not between 1000 and 5000;
   d) SELECT * FROM employee WHERE salary between 1000 and 5000;

32. Which SQL Query is used to remove the data from the database?
   a) Delete From table table-name
   b) Alter table table-name
   c) Drop table table-name
   d) All of the above

33. What is the result returned from the following Query:
Select StudentId, StudentName from Student where City not in ('Cairo', 'Alex');
   a) The id and name for all students
   b) The id and name for all students living in Cairo and Alex
   c) The id and name for all students living in either Cairo or Alex
   d) The id and name for all students who are not living in Cairo or Alex

34. Select … from Employee where dept name = "Accounting"
Which of the following should be used to find the max of the salary for the employees?
   a) Mean(salary)
   b) Avg(salary)
   c) max(salary)
   d) Count(salary)

35. What will happen if you run the following SQL command without a WHERE clause?
UPDATE Employees SET salary = salary + 500;
   a) Only one row will be updated
   b) No rows will be updated
   c) The query will result in an error
   d) All rows in the Employees table will be updated

36. The foreign key could be repeated. (يمكن ان يتكرر)
   a) True
   b) False

37. What will the CHECK constraint do in this statement?
CREATE TABLE Products (Price DECIMAL(5,2), CHECK (Price > 0));
   a) Makes Price unique
   b) Prevents NULL values in Price
   c) Ensures Price is less than 0
   d) Ensures Price is always greater than 0

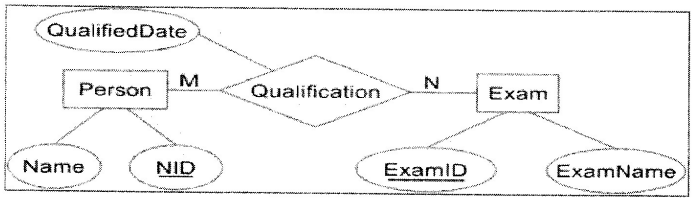
38. What is an advantage of a database?
   a) It saves data
   b) Can search through and find information quickly
   c) All of them
   d) None of them

39. Short text, date, long text and number are all examples of what?
   a) Headings
   b) Records
   c) Data types
   d) Tables

40. A hospital needs to store information about all the patients. The information needed about all the patients is stored in a ---- in the database.
   a) Record
   b) Table
   c) File
   d) Field

41. How can you change "Khaled" into "Adam" in the "Name" column in the Student table?
   a) UPDATE Student SET Name = 'Adam' WHERE Name = 'Khaled';
   b) UPDATE Student SET Name = 'Khaled' as Name = 'Adam';
   c) UPDATE Student SET Name = 'Khaled' into Name = 'Adam';
   d) Modify Student SET Name = 'Khaled' into Name = 'Adam';

42. Which of the following possible relations will NOT hold if the above ERD is mapped to relational model?

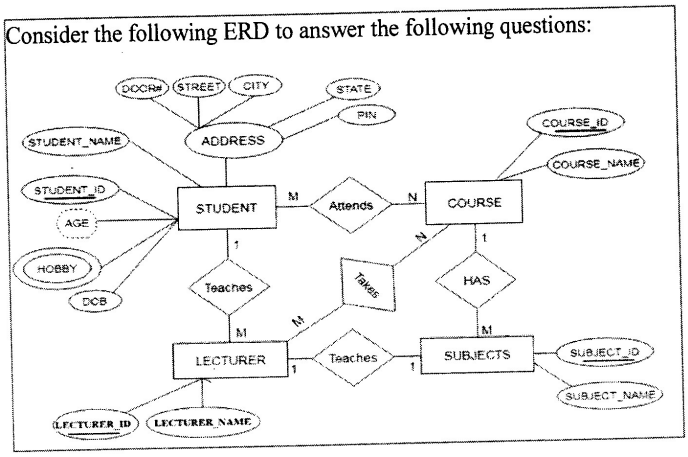


   a) Person(NID, Name)
   b) Qualification(NID, ExamID, Qualified date)
   c) Exam(ExamID, ExamName)
   d) Exam(NID, ExamID, ExamName)

43. Select … from Employee where Proj-name = "Project X";
Which of the following should be used to find the average salaries for employees working on "Project X"?
   a) mean(Salary)
   b) Sum(Salary)
   a) AVG(Salary)
   b) Count(Salary)

44. Which of the following SQL statements is correct? (0.5 Points)
   a) SELECT Username and Password from Customers;
   b) SELECT Username or Password from Customers;
   c) SELECT Username, Password from Customers;
   d) None of the above

Consider the following ERD to answer the following questions:



45. Mapping the relationship "teaches" (between Lecturer and Subject) into a relational model will result in:
    a) Lecturer(Lecturer_ID, Lecturer_Name, Subject_ID), Subject(Subject_ID, Subject_Name, Lecture_ID)
    b) Lecturer(Lecturer_ID, Lecturer_Name, Subject_ID), Subject(Subject_ID, Subject_Name)
    c) Both are correct
    d) None is correct

46. Mapping the relationship "has" into a relational model will result in:
    a) Subject(Subject_ID, Subject_Name, Course_ID)
    b) Subject(Subject_ID, Subject_Name)
    c) Course(Course_ID, Course_Name, Subject_ID)
    d) Has(Course_ID , Subject_ID)

47. Mapping the entity "Student" will result in a table named "Student" containing an attribute called "Hobby".
    a) True
    b) False

48. Mapping the entity "Student" will result in a table named "Student" containing an attribute called "Address"
    a) True
    b) False

49. Mapping the entity "Student", there will be another table called "Address" contains the following attributes: Address(PIN, state, street, city, Door#)
    a) True
    b) False

50. Mapping the entity "Student", there will be another table called "St_Hobby" contains the following attributes: St_Hobby(Student_ID, Hobby).
    a) True
    b) False

End of Exam

Best Wishes **Dr. Marwa Hussien**

	Assiut University- Faculty of Science Second Semester- Final Exam 2025-2026 Mathematics Department		Program: Mathematics Level : (3) Date: 5/31/2026 Time: 2 h
Course Title: Mathematical Foundations of Electromagnetic Theory and Special Theory of Relativity (1)			Code: M332
Instructors: Dr. Esraa Gamal			
Important:	No. of pages 2	No. Of questions 6	Total Mark:50 degree

Answer only five of the following questions.

Question No.1 : (10 marks)

(a) Δ ◊ State the Lorentz transformations between two inertial frames in standard configuration. Also, Using these transformations, derive the expressions for Lorentz transformations of velocities for S'→S.

(b) • An proton is moving at about 0.7c. Knowing 1 eV = 1.602 X 10^{-19} J, calculate the protons's:

(i) rest energy in MeV. (ii) total energy in MeV. (iii) kinetic energy in MeV. , $M_{proton} = 1.67x10^{-27}kg$

Question No. 2 : (10 marks)

(a)■ Define orthogonal curvilinear coordinates and explain the significance of the scale factors h_1, h_2, h_3.

(b)•◊Starting from the transformation between Cartesian and Spherical coordinates: $x = r\sin\theta\cos\varphi \quad , y = r\sin\theta\sin\varphi \quad , z = r\cos\theta$.

derive the scale factors h_r, h_θ, h_φ for Spherical coordinates.

(c) Δ Write the general expressions for divergence and curl in orthogonal curvilinear coordinates.

(d) •◊ For the vector field in Spherical coordinates: $\vec{A} = \frac{1}{r^2}\hat{e}_r + r\sin\theta\,\hat{e}_\varphi$ calculate:

(i) $\nabla \cdot \vec{A}$ (ii) $\nabla \times \vec{A}$

(e)* Comment on your results. Is the field solenoidal (divergence-free field) and/or irrotational? Justify your answer.

Question No. 3 : (10 marks)

(a) • Given that the electric field of an electromagnetic wave propagating in the z-direction is:

$$E = E_m \sin(\omega t - \beta z)\,\hat{a}_y$$

Use Maxwell's equation $\nabla \wedge E = -\partial B/\partial t$ to find the magnetic field B.

(b) • ◊ A Wi-Fi access point (router) transmits a signal with a total average power of $P_{total} = 0.10$ W.

(i) Assuming the router radiates isotropically (uniformly in all directions), calculate the signal intensity (average Poynting vector ⟨S⟩) at a distance r = 10 m from the router.

(ii) If the minimum intensity required by a mobile phone to receive the signal is $I_{min} = 1 \times 10^{-7}$ W/m², determine whether the phone can connect to the router at this distance. Justify your answer.

Question No. 4 : (10 marks)

(a) • A circular loop of area $A = 5 \times 10^{-2}$ m² is placed in a uniform magnetic field of magnitude B = 0.2 T. The loop rotates about its diameter which is perpendicular to the field. Calculate the magnetic flux Φ linked with the loop when its plane is:

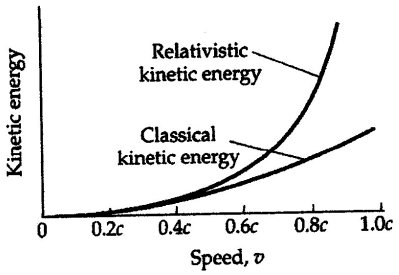
(i) Normal to the magnetic field ($\theta = 0°$). (ii) Inclined at 60° to the magnetic field.

(iii) Parallel to the magnetic field ($\theta = 90°$).

(b) * Using Biot-Savart's law result for Calculate the magnetic field arising from a section of a circular wire of radius R, which encloses a central angle of value φ, and a current of intensity i passes through it at its geometric center.

Question No. 5 : (10 marks)

(a) *•The figure below depicts a comparison between Newtonian mechanics and Einstein's relativistic mechanics at high speeds. Note that both models agree at low speeds, but diverge significantly as velocity approaches c.



(i) Explain why Newtonian mechanics is inaccurate for calculating kinetic energy at speeds near c.

(ii) Show that when v ≪ c (i.e., β = v/c ≪ 1), the relativistic kinetic energy reduces to the classical expression .

(b) A particle of mass m is accelerated such that its kinetic energy equals its rest energy ($K = mc^2$).

(i) • Find the particle's speed v as a fraction of c.

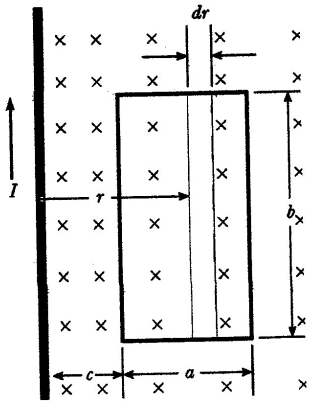
(ii) ◊ A student uses the classical formula $K = (1/2)mv^2$ to solve the same problem. Show that this leads to an unphysical result.

(iii) •Calculate the percentage error in the speed obtained using the classical formula.

(iv) * Explain physically why the classical approach fails in this situation.

Question No. 6 : (10 marks)

(a) •◊ A rectangular loop of width *a*and length *b*is placed near an infinitely long straight wire carrying an electric current *I*, as shown in the figure. The distance between the wire and the nearest side of the loop is *c*. The wire is parallel to the longer side of the loop. Calculate the total magnetic flux passing through the loop due to the current in the wire.



(b) ◯ Propose a suitable mathematical method to calculate the total electric charge contained within a right circular cone. The cone is defined by the angular range $0 \le \theta \le \pi/3$ and a radius of $r \le 5$ meters. Your solution must include the selection of an appropriate coordinate system, the definition of the volume element and the corresponding limits of integration, and the evaluation of the resulting integral to obtain the total charge. The volume charge density inside the cone is given by:

$$\rho_v = 20r^3 \cos^2\theta \ (mC/m^3)$$

End of Exam **Best Wishes**

Dr. Esraa Gamal

Δ Remember ■Understand •Apply ◊Analysis *Evaluate ◯Create

بسم الله الرحمن الرحيم

قسم الرياضيات-كلية العلوم
الفصل الدراسى الثانى 2026/2025م
عمليات عشوائيةوتطبيقاتها
ساعات

المستوى الثالث شعبة الرياضيات
رقم المقرر ورمزه : 346ر أ

Department of Mathematics
Faculty of Science
الزمن : ثلاث

أجب عن خمسة أسئلة فقط مما يأتي :- درجة جزء كل سؤال (خمس درجات)

1-(أ) في عملية برنولى العشوائية $\{X_n\ , n \geq 1\}$ بالإحتمال p=0.5 أوجد دالة الكتلة الإحتمالية المشتركة للمتغير الثنائي (X,Y) بفرض أن $X = X_1$ ، $Y = X_1 + X_2$ ثم اوجد $Cov(X,Y)$.

(ب) اذكر التصنيفات الممكنة للعمليات العشوائية في بعد واحد ثم عرف العمليات العشوائية في بعدين مع ذكر مثال توضيحي

2-(أ) في السؤال 1-(ا) بفرض أن $Y_n = \sum_1^n X_i$ أذكر توزيع Y_n ثم اوجد $E(Y_n{}^2)$.

(ب) في العملية العشوائية $\{Y_n\ , n \geq 0\}$ إحسب كل من :

$P(Y_5 = 2, Y_8 = 7)$ ، $P(Y_5 = 3\ , Y_7 = 4\ , Y_{12} = 5)$.

3-(أ) في عملية برنولى العشوائية $\{X_n\ , n \geq 1\}$ عرف أزمنة النجاح كعملية عشوائية واذكر فقط توزيع المتغير العشوائى المناظر لها موضحا العلاقة بينه وبين توزيع Y_n .

(ب) عرف العمليات العشوائية بالزيادات المستقلة والمستقرة موضحا ذلك بمثال.

4-(أ) في عملية بواسون أو عملية الوصول المعدودة $\{N_t; t \geq 0\}$ بالمعدل $\lambda = 4$ احسب $P(N_{1.5} = 4\ , N_{3.5} = 7)$

(ب) في عملية الوصول المعدودة $\{N_t; t \geq 0\}$ بالبارامتر λt أثبت أن الإحتمال المشروط لعدد الوصول N_t بالنسبة لعدد الوصول N_{t+s} يمثل توزيع ذوالحدين .

5-(أ) عرف عملية التجديد العشوائية (رينوال) $\{R_n; n \geq 0\}$ وعلاقتها بعملية الوصول المعدودة $\{N_t; t \geq 0\}$ موضحا النتائج الخمس المعروفة بينهما .

(ب) في السؤال 5-(أ) اوجد دالة التجديد معبرا عنها من خلال دالة التوزيع $P(R_n \leq t) = F_n(t)$ ثم عبر عن دالة التجديد هذه من خلال تحويلات لابلاس .

6-(أ) في سلسلة ماركوف العشوائية المتقطعة $\{X_n; n \geq 0\}$ عرف مصفوفة الاحتمالات الانتقالية ثم أوجد صيغة للاحتمال:

$$P(X_0 = x_0\ , X_1 = x_1\ ,\ \ldots\ X_n = x_n)$$

(ب)- في سلسلة ماركوف العشوائية المتقطعة $\{X_n; n \geq 0\}$ بحالات الفراغ 0 ، 1 والمصفوفة العشوائية : $\begin{pmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{3} & \frac{2}{3} \end{pmatrix}$،

ومتجه الاحتمالات الابتدائية: $\pi_0 = (2/5 \quad 3/5)$

احسب الاحتمالات الآتية:

$P(X_0 = 0\ , X_1 = 1\ , X_2 = 0, X_3 = 1\ , X_4 = 0\ , X_5 = 0)$ ، $P(X_0 = 1\ , X_2 = 1\ , X_4 = 0, X_5 = 1)$

نهاية الأسئلة

أد/ محمود ابراهيم محمود ، أد/ زينهم فكرى جاهين

جامعة أسيوط – كلية العلوم امتحان نهاية الفصل الدراسي الأول ٢٠٢٥/٢٠٢٦م قسم الرياضيات	برنامج : الرياضيات المستوي : (٣) التاريخ :٢٧ / ١٢/٢٠٢٥م الزمن : ٢ ساعات	كلية العلوم جامعة أسيوط
اسم المقرر: طرق رياضية	رقم المقرر: ٣٣٤ر	
أستاذ المقرر : أ.د / محمد عزب عبد الله		
عدد صفحات الامتحان : ٢	عدد الأسئلة : ٥	الدرجة الكلية : ٥٠ درجه

أجب عن أربعة أسئلة فقط مما ياتي: (١٢.٥ درجه لكل سؤال)

(١-أ) أثبت أنه إذا كان $L^{-1}\{f(s)\}=F(t)$ فإن :

$$(i)\ L^{-1}\{f(s-a)\}=e^{at}F(t)$$

$$(ii)\ L^{-1}\{e^{-as}f(s)\}=\begin{cases}F(t-a) & , \ t>a\\ 0 & , \ t<a\end{cases}$$

(ب) أوجد كل مما يأتي :

$$(i)\ L\{\cos^2 4t\} \quad , \quad (ii)\ L\{\sin\sqrt{t}\}$$

(ج) احسب التكاملات الآتية:

$$(i)\ \int_0^\infty \frac{e^{-t}-e^{-3t}}{t}\,dt \quad , \quad (ii)\ \int_0^\infty t^3 e^{-t}\sin t\,dt$$

(٢-أ) حل المعادلة التفاضلية الاتية:

$$tY''(t)+Y'(t)+4tY(t)=0 \quad , \quad Y(0)=3\ , y'(0)=0$$

(ب) أوجد كل مما يأتي :

$$(i)\ L\{e^{-5t}(7\cos 2t-9\sin 2t) \quad , \quad (ii)\ L\{te^{-t}J_\circ(\sqrt{2}t)\}$$

(٣- أ) إذا كان $L\{F(t)\}=f(s)$ فبرهن علي ان :

$$(i)\ L\{\cos at\}=\frac{s}{s^2+a^2} \quad , \quad (ii)\ L\{\cosh at\}=\frac{s}{s^2-a^2}$$

(ب) ارسم الدالة $F(t)$ المعرفة كالتالي : $F(t)=\begin{cases}\sin t & , \ 0<t<\pi\\ 0 & , \ \pi<t<2\pi\end{cases}$ ثم أوجد تحويل لابلاس لها.

(ج) أوجد $L\{(t^2-4t+6)\sin 5t\}$

(٤-أ) أثبت أنه إذا كان $L\{F(t)\}=f(s)$ فإن

$$(i)\ L\{\operatorname{erf}\sqrt{t}\}=L\{\frac{2}{\sqrt{\pi}}\int_0^{\sqrt{t}} e^{-u^2}du\}=\frac{1}{s\sqrt{s+1}} \quad ,$$

$$(ii)\ L\{Si(t)\}=L\{\int_0^t \frac{\sin u}{u}du\}=\frac{1}{s}\tan^{-1}\frac{1}{s}$$

(ب) استخدم تحويلات لابلاس في حل المعادلة التفاضلية الجزئية الاتية :

$$\frac{\partial U}{\partial t}=\frac{\partial^2 U}{\partial x^2}-4U$$

$$U(0,t)=0 \quad , \quad U(\pi,t)=0 \quad , \quad U(x,0)=6\sin x-4\sin 2x$$

بقية الأسئلة في الخلف ←

(٥-أ) استخدم تحويلات لابلاس لحل المعادلة التكاملية الآتية: $\int_0^t \frac{Y(u)}{\sqrt{t-u}}du = 1+t+t^2$

(ب) أوجد كل مما يأتي : ة

$$(i)L^{-1}\{\frac{(s+1)e^{-\pi s}}{s^2+s+1}\},\quad (ii)L^{-1}\{\frac{1}{(s^2+36)(s^2+16)}\},(iii)L^{-1}\{(1+te^{-t})^3$$

انتهت الأسئلة مع التمنيات بالتوفيق ،،،،،،،،،،،

أ.د/ محمد عزب عبد الله & د/ أيمن شحاته

	Assiut University- Faculty of Science **Frist Semester- Final Exam 2025-2026** **Mathematics Department**	**Program: Pure Mathematics** **Level: (3)** **Date: 27/12/2026** **Time: 3 h**	
Course Title: Selected Topics (II)		**Code: 327 Math**	
Instructors: Prof. Dr. Abdalla El-Safty & Dr. Sayed A. Dahy			
Important:	**No. of pages 2** / **No. Of questions 6**	**Total Mark:50 degree**	

Answer Only Five Questions of the Following

Q 1) If the nonlinear system $x_1^2 - 10x_1 + x_2^2 + 8 = 0, \qquad x_1x_2^2 + x_1 - 10x_2 + 8 = 0$

is transformed into a fixed-point problem

$$x_1 = g_1(x_1, x_2) = \frac{x_1^2+x_2^2+8}{10}, \qquad x_2 = g_2(x_1, x_2) = \frac{x_1x_2^2+x_1+8}{10}$$

A) Show that, $G = (g_1, g_2)^T$ mapping D $\subset$ R^2 into R^2 has a unique fixed-point in $D = (x_1, x_2)^T, 0 \le x_1, x_2 \le 1.5$.

B) Apply functional iteration to find $x^{(1)}$ and $x^{(2)}$ use $x^{(0)} = (1.1, 0.9)^T$.

Q 2) **A)** Obtain the following estimate for the absolute error in the Lagrange interpolation formula:

$$|f(x) - L_n(x)| \le \frac{M_{n+1}}{(n+1)!}|\pi_{n+1}(x)|,$$

where $M_{n+1} = \max|f^{(n+1)}(x)|$, and $\pi_{n+1}(x) = (x - x_0)(x - x_1)\cdots(x - x_n)$.

B) To what degree of accuracy do we calculate $\sqrt[3]{19}$ by means of Lagrange's interpolation polynomial for the function $y = \sqrt[3]{x}$, if we choose $x_0 = 1, x_1 = 8, x_2 = 27$

Q 3) Given the data

x_i	4.0	4.2	4.5	4.7	5.1	5.5	5.9	6.3	6.8	7.1
y_i	102.56	113.18	130.11	142.05	167.53	195.14	224.87	256.73	299.50	326.72

A) Construct the least squares polynomial of degree one.

B) Construct the least squares approximation of the form be^{ax}.

Q 4) **A)** Put the following matrix in the form of $L.U$. Factorization $A = \begin{pmatrix} 1 & 3 & 0 \\ 2 & 2 & 1 \\ 0 & 1 & 4 \end{pmatrix}$.

B) Use the resulted L and U matrices to solve the following linear system

$$x + 3y = 10, \qquad 2x + 2y + z = 9, \qquad y + 4z = 7.$$

Please turn the page over ...

Q 5) Use the shooting method to treat with the boundary value problem

$$y'' - y = 0, \qquad y(0) = 0, \quad y(0.5) = 1.$$

Start with the initial approximations $\alpha_0 = 0.4, \alpha_1 = 0.6$ for $h = 0.25$

Q 6) A) For the Chebshev polynomials $T_n(x)$, prove the orthogonality relation:

$$\int_{-1}^{1} T_n(x)T_m(x)w(x)dx = \begin{cases} \pi, & m = n = 0, \\ \frac{\pi}{2}, & m = n \neq 0, \\ 0, & m \neq n, \end{cases} \qquad \text{where } w(x) = \frac{1}{\sqrt{1-x^2}}.$$

B) Fit the following points using Chebyshev polynomials

x	-0.25	0	0.5
y	1	4	12

End of Exam

Best Wishes **Prof. Dr. Abdalla El-Safty**
Dr. Sayed A. Dahy

	Assiut University- Faculty of Science Frist Semester- Final Exam 2025-2026 Mathematics Department	Level : (3) Date: 2/1/2026 Time: 2 hours	
Course Title: Introduction to Scientific Computations		Code: 356MC	
Instructors: Dr. Fatma Hussein		Important: Solution on the same paper	
No. of pages 4	No. of questions 3	Total Mark: 50 degree	

Question No. 1: Choose the correct answer (20 marks)

➢ The following MATLAB code uses the Newton-Raphson method to find a root of the equation $x^3 - 2x^2 + x - 3 = 0$ with the initial point 4 and tolerance (tol) = 0.001. Answer the following questions numbered 1-6.

```
function x2=newton(x1,tol)
f=@(x) x^3-2*x^2+x-3;
fd=.....①.....;
x2=x1-(f(x1)/fd(x1));
while .....②.....
  x1=x2;
  .....③.....;
end
```

1. Which of the following expressions is valid in place number ①?
   a) @(x) 3*x^2-4*x+1 b) inline(3*x^2-4x+1)
   c) @(x) (6*x-4) d) both a and b
2. In the position number ②, the appropriate expression to check if the method converged to the root is……..
   a) abs(x1-x2) > tol b) abs(x1-x2) < tol
   c) (x1-x2) < tol d) abs(x1+x2) > tol
3. The correct formula for Newton method in place number ③ is……
   a) x2=x1+(f(x1)/fd(x1)) b) x2=x1-(fd(x1)/f(x1))
   c) x2=x1-(f(x1)/fd(x1)) d) x2= x1*(f(x1)/fd(x1))
4. What is the correct way to call the function in the presented MATLAB code?
   a) x2=newton(4,0.001) b) x2=(4,0.001)
   c) function =newton(0.001,4) d) x2=function (4,0.001)
5. What does the tolerance (tol) parameter represent in the provided MATLAB code?
   a) The maximum number of iteration b) The accuracy of the root approximation
   c) The step size for updating the midpoint d) The size of the interval
6. What is the convergence rate of the Newton-Raphson method?
   a) Exponential b) Linear c) Super linear d) Quadratic

---

7. The false position method of finding roots of nonlinear equations falls under the category of a (an) _____ method.
   a) graphical b) open c) random d) bracketing
8. Bisection Method always converges if which condition is true for the chosen interval [a,b]?
   a) f(a) f(b) > 0 b) f(a) f(b) < 0 c) f(a)= f(b) d) No condition is needed
9. The trapezium rule uses _____ to approximate the area under a curve.
   a) rectangles b) triangles c) trapeziums d) None of these

10. What is the default extension for MATLAB files?
a) .m b) .mat c) .txt d) .script

11..... is not a predefined function in Matlab.
a) inf b) gravity c) i d) pi

12. The output of the following MATLAB statement
>> y='4+5'
a) 9 b) 45 c) 4+5 d) Error

13.---------- shows all the variables created and/or imported from files.
a) Command window b) Workspace
c) Command history d) Current folder

14. To generate the graph of e^{5t}, which of the following codes can be used in MATLAB?
a) plot(t,e^(5t)) b) plot(t,exp(5*t))
c) graph(t,exp(5*t)) d) graph(t,e^(5*t))

15. Which command in MATLAB is used to create a matrix with ones on the diagonal and zeros elsewhere?
a) ones b) zero c) det d) eye

16. What is the output of y in the following statements
>> x=4;
>> x/2;
>> y=ans*5
a) 5 b) 10 c) 20 d) ???Undefined function or variable 'ans'

17. Which vector is generated by the following statement?
>> x = linspace(0,1,5)
a) 0, 1, 2, 3, 4 b) 1, 2, 3, 4, 5
c) 0, 0.2, 0.4, 0.6, 0.8 d) 0, 0.25, 0.5, 0.75, 1

18. The output of the last line is
for i=1:1:6
end
i
a) 1 b) 1,2,3,4,5,6 c) 6 d) Undefined function or variable i

19. The command used to find the value of x for the equation $e^x - 2x - 1 = 0$
a) solve('e^(x)-2*x-1', x) b) roots(exp(x)-2*x-1)
c) solve('exp(x)-2*x-1') d) roots(exp(x)-2*x-1,x)

20. The while end loop will complete repetitions
a) until a logic statement is false b) until a logic statement is true
c) until a counter has expired d) indefinitely

Question No. 1 answers

Question	1	2	3	4	5	6	7	8	9	10
Answer										
Question	11	12	13	14	15	16	17	18	19	20
Answer										

Question No. 2: Put T for true and F for false **(14 marks)**

1. In the open methods, the method starts with one or more initial guess points.
2. Bisection uses the tangent line to approximate the root.
3. Secant method is an open method and it is always convergent.
4. Any polynomial with an odd order has at least one real zero.
5. Simpson rule is approximation of the definite integral of a function.
6. The variables "A" and "a" are considered to be the same in MATLAB.
7. The 'clc' command in MATLAB clears all the text from the command window, resulting in a clear screen.
8. Colon operator (:) generates regularly spaced elements and represents an entire row or column.
9. The MATLAB command 'trapz(x,y)' uses trapezoidal integration to compute the integral of y with respect to x.
10. The value of the expression $y = sin\, x + cos\, 2x$ for x=$\pi/4$ can be computed by using the following MATLAB code:

```
>> x=pi/4;
>> y=sin x+ cos 2x
```

11. MATLAB provides some special expressions for some mathematical symbols, like Inf for not a number.
12. The plot command in Matlab can be used to plot multiple curves within the same figure.
13. We can find a root of x^5+x^3+3 around -1 using the Matlab command

```
>> f = x^5+x^3+3
>> fzero(f,-1)
```

14. The for end loop will repeat a segment of program while a conditional statement is true.

Question No. 2 answers

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Answer														

Question No. 3: **(16 marks)**

Answer the following questions **(4 marks for each question)**

Use MATLAB's Symbolic Math Toolbox to perform the following symbolic calculations:

(i) Solve the equation $xy - y^2 - 5x + 7 = 0$ in terms of x.

(ii) Find the second derivative of the function $f(x, y, z) = x^3y^2z$ with respect to y

(iii) Calculate the integration $\int_1^2 \int_0^1 xy \; dydx$

(iv) Calculate the $\lim_{x \to 0} \frac{x}{\sin(x)}$

End of Exam

Best Wishes **Dr. Fatma Hussein**

Assiut University
Faculty of Engineering
Mining & Metall.dept.

Final Examination for 3rd (Mineral prospection and industrial minerals and rocks (Chem 305)
Second term Jan2026
Time: 2 hours

Answer the following Questions:

Question 1 (20 Marks)

A- Mark the correct sentence with (√) and the false one with (×) (15 marks)

1- If the thickness of the ore is small, the best way to detect is to make trenches. ( )

2- Sedimentary methods: their formation is controlled by different sedimentation factors. ( )

3- The most important metamorphic mineral deposits are asbestos, graphite and talc deposits ( )

4- Tantalum is widely used in the manufacture of surgical equipment and devices implanted in the human body ( )

5- Lithium is a component of small batteries in electronic devices. ( )

6- Argillic alteration, in which rock minerals, especially andesite , are transformed into clay minerals (kaolin). ( )

7- Ceramic material is an organic and non-metallic oxide ( )

8- The modern ceramic materials, which are classified as advanced ceramics, include silicon carbide and tungsten carbide. ( )

9- Filler (materials), particles added to a matrix material, usually to improve its properties ( )

10- Electrical insulators are used to hold conductors in position ( )

11- Mercury enters the digestive system through agricultural or other environmental sources ( )

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10- Electrical insulators are used to hold conductors in position ( )

11- Mercury enters the digestive system through agricultural or other environmental sources ( )

12- The minerals necessary for humans are: sodium, potassium, magnesium, ( )

13- Zinc deficiency is usually attributed to poor diet and can cause developmental delays ( )

14- Tungsten polyoxanion can be used to treat AIDS. ( )

15- Allergic reactions to nickel, especially between skin and metals through jewelry, are common ( )

16- A homogeneous catalysis is one whose components are not dispersed in the same phase. ( )

17- A pigment is a material that changes the colour of reflected or transmitted light. ( )

18- Calc-silicates: This change occurs on the areas of contact between the granit and intrusions and limestone ( )

19- pigment is a colored material that is completely or nearly insoluble in water ( )

20- flux isn't used to remove oxide films, promote wetting, and prevent re-oxidation ( )

Question 2 (20Marks)

A- Complete the following sentences with the correct words **(15 Marks)**

1- The two largest segments for filler material use is ----------and----------

2- Referred to as "chalk" in the plastic industry, calcium carbonate is derived from ----------and ----------

3- --------- is the process of increasing the rate of a chemical reaction by adding a substance known as a----------

4- The most common form of crystalline---------- is known as corundum.

5- Important heterogeneous catalysts include ---------- and----------

6- Raney nickel is a fine-grained solid composed mostly of nickel derived from ----------

7- Some common uses for abrasives include ---------- and ----------

8- Abrasives generally rely upon a difference in ---------- between the abrasive

9- ----------and ---------- is a common abrasive materials

10-Ceramic materials are ----------in compression, and ---------- in tension.

11-Metallic pigments, as implied in the name, include metal pigments such as ----------and---------- pigments.

12- Building stones belong to a----------, ----------, and ----------origin.

13- Industrial gypsum: it is broken into suitable sizes to feed ----------or ----------

14-fertilization focuses on three main macro nutrients: ----------, ----------, and ----------

15-Fertilizers enhance the growth of ----------

B-Some factors which will affect how quickly a substance is abraded include:

(5 marks)

Question 3 **(10 Marks)**

1- Select the correct answer from words?

a- The copper conductors utilized in the electrical wiring of homes are insulated from each other and from

i- Porcelain

ii- Mica iii- Plastics

b- Thermal insulating materials include

i- Fiberglass

ii- Glass iii- Silicon

c- Tin-lead solder attaches very well to

i- Copper

ii- Iron iii- Silica

d- ---------is used to remove oxide films, promote wetting, and prevent reoxidation of the surfaces during heating.

i- zinc chloride

ii- Limestone iii- Dolomite

e- -------is commonly used for this purpose in smelting iron ores

i- Fluorite

ii- Limestone iii- Mica

f- Typically, materials used as abrasives are either hard minerals rated at

i- 6 Mohs scale

ii- 7 Mohs scale iii- 4 Mohs scale

g- Important heterogeneous catalysts include

i- Raney nickel

ii- Acetic acid iii-Enzymes

h----------are manufactured by relatively simple chemical processes such as xidation

i- Pigments

ii- fluxes iii-abrasives

I- Metallic pigments, as implied in the name, include metal pigments such as
i-zinc and aluminum

ii-silicone and limestone iii-clay and alabaster

J- Semiconductor electronic parts include transistors

i-Solar cells

ii- Fiberglass iii-Silicone

Best wishes

Dr. Prof. Gamal Y. B. Shoeib

	Assiut University- Faculty of Science Frist Semester- Final Exam 2025-2026 Computer Science Department	Level : (3) Date: 15/5/2026 Time: 2 h	
Course Title: Intelligent Systems		Code: 355د	
Instructors: Dr. sara salah Mohamed			
Important:	No. of pages 4	Total Mark:50 degree	

Answer all the Following Questions:

Choose the correct answer: [50 marks]

1-An agent = _____ + _____ . (1 Point)
a) Sensors + Actuators
b) Architecture + Program
c) Hardware + Software
d) Percepts + Actions9

2- A high mutation rate in a GA is likely to cause____. (1 Point)
a) Faster convergence
b) Loss of genetic diversity
c) Random search behavior
d) No effect

3- Which of the following is the best example of a sequential task environment? (1 points)
a) An agent that grades multiple-choice exams one after another, where each answer sheet is independent.
b) An agent that decides which card to play in a game of Poker, where the current decision affects the pot and the opponent's future behavior.
c) An agent that classifies whether an image contains a cat, where each image is processed individually.
d) A thermostat that turns the heat on/off based solely on the current temperature reading.

4-What is the role of encoding in Genetic Algorithms? (1 Point)
It determines the probability of crossover.
b) It converts candidate solutions into a form suitable for processing.
c) It selects the individuals for reproduction.
d) It controls the mutation rate.

5- A human doctor diagnosing a patient faces a task environment that is best described as: (2 points)
a) Fully observable, deterministic, episodic
b) Partially observable, stochastic, sequential
c) Fully observable, stochastic, episodic
d) Partially observable, deterministic, single-shot

6- The problem generator in a learning agent is responsible for: (2 Points)
a) Creating random actions to explore the environment
b) Proposing actions that lead to new or informative experiences, balancing exploration and exploitation
c) Storing the agent's knowledge base
d) Evaluating the fitness of candidate solutions

7- What is the fundamental definition of an agent? (1 Point)
a) A software program that executes algorithms
b) Anything that can perceive its environment through sensors and act upon it through actuators
c) A robot with artificial intelligence capabilities
d) A system that can think like a human
e) None of the definition is complete

8- A reflex agent with internal state differs from a simple reflex agent because it: (1 Point)
a) Uses a lookup table
b) Maintains a description of the current world state
c) Does not use rules
d) Cannot learn from experience

9- Which statement about uniform crossover for binary strings is TRUE? (2 points)
a) It always uses exactly one crossover point
b) Each bit position is swapped independently with a fixed probability.
c) It cannot be used with mutation
d) It only works for binary representations with even length

10-A chess-playing AI that operates on a standard clock (where the board only changes when a move is made) is operating in a task environment that is _(2 points)
a) Dynamic and continuous
b) Static and discrete
c) Stochastic and sequential
d) Dynamic and episodic

11-What is the basic principle behind Particle Swarm Optimization (PSO)? (1 point)
a) Optimize a problem by having particles share information about their positions and velocities.
b) PSO relies on random selection of solutions without any social interaction.
c) The principle of PSO is based on genetic algorithms and crossover techniques.
d) PSO optimizes problems by using a single particle that explores the solution space alone.

12-How do particles in PSO update their positions? (2 points)
a) Particles in PSO update their positions by randomly selecting a new position in the search space.
b) Particles in PSO update their positions by averaging the positions of all other particles.
c) Particles in PSO update their positions by multiplying their velocity with their current position.
d) Particles in PSO update their positions by adding their velocity to their current position.

13-Eplain the significance of the cognitive and social components in PSO. (2 points)
a) The cognitive component allows individual learning from personal bests, while the social component facilitates learning from the group.
b) The cognitive component is irrelevant, and the social component only hinders individual progress in Particle Swarm Optimisation (PSO).
c) The cognitive component enhances group dynamics, whereas the social component restricts personal achievements in Particle Swarm Optimisation (PSO).
d) The cognitive component focuses solely on group learning, while the social component limits individual exploration.

	Assiut University- Faculty of Science Second Semester- Final Exam 2025-2026 Mathematics Department	Program: Computer Science Level: (3) Date: 17/5/2026 Time: 2 h	
Course Title: قواعد البيانات رك ٣٥٧			
Instructors: Dr. Marwa Hussien Mohamed			
Important:	No. of pages 8	No. Of questions 50	Total Mark: 50 Marks

1. Choose the Correct Answer: (50 Marks)

1. In a University system: Each student can have multiple emails; each email belongs to only one student.

What is the BEST Relational Model design?

a) Add Email as a simple attribute in Student
b) Add Email as a multivalued attribute
c) Create a separate Email entity with 1:M relationship
d) Ignore emails

2. A relationship "Manages" exists between Employee and Department: Each department must have exactly ONE manager; an employee may manage multiple departments.
What is the cardinality?

a) 1:1
b) 1:M (Employee → Department)
c) M:1 (Employee → Department)
d) M:N

3. A Relational Model shows: Student(StudentID, Name, CourseID).

What is the design flaw?

a) Missing primary key
b) Redundant attribute
c) Improper handling of many-to-many relationship
d) No flaw

4. Which situation BEST represents a weak entity?

a) Course depends on Department
b) Dependent depends on Employee
c) Student depends on University
d) Employee depends on Salary

5. What is wrong with this query? --- SELECT DeptName, COUNT(*) FROM Students;

a) COUNT(*) is not a valid function
b) Missing GROUP BY
c) DeptName is invalid
d) No issue

6. Which command is used to restrict the number of records returned from a query?

a) Group by
b) Like
c) Where
d) Limit

7. Which query correctly finds students NOT enrolled in any course?

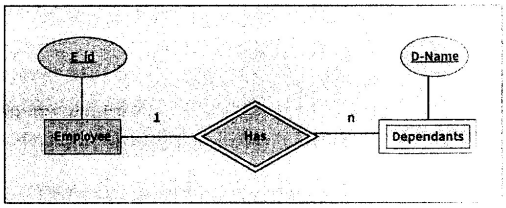
a) SELECT * FROM Students WHERE StudentID NOT IN (SELECT StudentID FROM Enrollments);
b) SELECT * FROM Students S JOIN Enrollments E ON S.StudentID = E.StudentID;
c) Both A and B
d) None

8. To display Students' names whose age are more than or equal to 21, we write the following SQL Query?

a) Select Name from Student S where S.Age >21;
b) Select Name from Student S where S.Age <21;
c) Select Name from Student S where S.Age >=21;
d) Select Name from Student S where S.Age <=21;

9. The "has" relationship in this Figure:

a) must be total on the "Employee" entity side
b) must be total on the "Dependent" entity side
c) Both are correct
d) None is correct



10. What does this query return?
SELECT DeptID FROM Students GROUP BY DeptID HAVING COUNT(*) = 1;

a) Departments with no students
b) Departments with exactly one student
c) All departments
d) Error

11. ----- constraint is used to ensure that every value in a particular column has a different value.

a) Not Null
b) Check
c) Unique
d) Default

12. What is the result of this query? --- SELECT * FROM Students S, Departments D;

a) INNER JOIN
b) CROSS JOIN
c) LEFT JOIN
d) NATURAL JOIN

13. Which statement adds a NOT NULL constraint to the "Name" column?

a) ALTER TABLE emp MODIFY Name VARCHAR(50) NOT NULL;
b) ALTER TABLE emp ADD NOT NULL Name
c) UPDATE emp SET Name NOT NULL;
d) ALTER TABLE emp CONSTRAINT Name NOT NULL;

14. Which SQL Query is used to remove a table and all its data from the database?

a) Delete From table table-name
b) Alter table table-name
c) Drop table table-name
d) All are correct

15. What will this query returns?
SELECT * FROM Customers WHERE Country = 'Egypt' AND NOT City = 'Cairo';

a) All customers in Egypt or not in Cairo
b) All customers in Cairo only
c) All customers where both Country is Egypt and City is not Cairo
d) All customers in Egypt and Cairo

Consider the Employee table to answer the questions from 16 to 20. What will each query return?

EmpID	Name	Dept	Salary
1	Ahmed	HR	5000
2	Sara	IT	7000
3	Ali	IT	7000
4	Mona	HR	6000
5	Tarek		4500

16. SELECT Count (Dept) FROM Employee;

a) 5
b) 2
c) 4
d) 1

17. SELECT Name FROM Employees WHERE Salary = (SELECT Min(Salary) FROM Employees);

a) Sara
b) Sara and Ali
c) Tarek
d) All Employees

18. SELECT COUNT(*) FROM Employees WHERE Dept = 'IT' OR Salary >= 6000;

a) 0
b) 1
c) 2
d) 3

19. SELECT Name FROM Employee WHERE Dept IS NOT NULL ORDER BY Salary, Name;

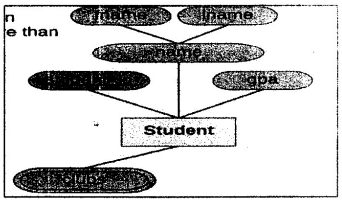
a) Tarek
b) Ahmed, Mona, Ali, Sara
c) Sara, Ali, Mona, Ahmed
d) Ali, Sara, Mona, Ahmed

20. SELECT Count(EMPID) FROM Employee WHERE Salary NOT BETWEEN 6000 AND 7000;

a) 5
b) 1
c) 4
d) 2

21. Mapping the entity "Student" into relational model, there will be another table called "Student_Name" which has the following attributes: Student_Name (Student_id, Fname, Lname)?

a) True
b) False



22. Find the ages of students from the Student table who are living in Asyut or Cairo and their degrees are more than or equal to 60.

a) SELECT age FROM Student WHERE (city = 'Asyut' AND city = 'Cairo') OR degree <= 60;
b) SELECT age FROM Student WHERE (city = 'Asyut' OR city = 'Cairo') OR degree >= 60;
c) SELECT age FROM Student WHERE (city = 'Asyut' OR 'Cairo') AND degree > 60;
d) SELECT age FROM Student WHERE (city = 'Asyut' OR city = 'Cairo') AND degree >= 60

23. The "As" clause is used to ... in the returned query result

a) Copy a column
b) Rename a column
c) Update a column
d) Select a column

24. Which query returns students who enrolled in ALL courses?

a) SELECT StudentID FROM Enrollments GROUP BY StudentID HAVING COUNT(*) = (SELECT COUNT(*) FROM Courses);
b) SELECT * FROM Students;
c) SELECT COUNT(*) FROM Enrollments;
d) None

25. Which command would you use to add a new column to an existing table?

a) ADD COLUMN TO table_name
b) ALTER TABLE table_name ADD column_name datatype
c) UPDATE TABLE ADD column_name
d) Create TABLE table_name ADD column_name

26. What does a PRIMARY KEY constraint do?

a) Prevents duplicate rows
b) Ensures the column doesn't have null values
c) Uniquely identify each row in a table
d) All of the above

27. Which symbol is used to represent a multivalued attribute in ERD?

a) Rectangle
b) Double oval
c) Diamond
d) Triangle

28. Which statement is used to get all data from the student table whose name contains letter 'd'?

a) SELECT * FROM student WHERE name LIKE '%d';
b) SELECT * FROM student WHERE name LIKE '%d%';
c) SELECT * FROM student WHERE name LIKE 'd%';
d) SELECT * FROM student WHERE name LIKE '%_d';

29. For the following two ENTITIES, which is the appropriate relationship: Student / Graduation_Project?

a) 1:1
b) 1:M
c) M:N
d) None of the above

30. The GPA can be considered as _____

a) Primary Attribute
b) Derived Attribute
c) Composite Attribute
d) Multivalued Attribute

31. Which clause is used to filter rows in a database table?

a) WHERE
b) GROUP BY
c) ORDER BY
d) HAVING

32. Which query finds distinct departments?

a) SELECT DeptID FROM Students;
b) SELECT UNIQUE DeptID FROM Students;
c) SELECT ALL DeptID FROM Students;
d) SELECT DISTINCT DeptID FROM Students;

33. Which query shows students with their department names?

a) SELECT Name, DeptName FROM Students S INNER JOIN Departments D ON S.DeptID = D.DeptID;
b) SELECT Name, DeptName FROM Students, Departments;
c) SELECT Name FROM Students;
d) SELECT DeptName FROM Departments;

34. What is the result returned from the following Query:
Select StudentId, StudentName from Student where City not in ('Cairo', 'Alex');

a) The id and name for all students
b) The id and name for all students living in Cairo and Alex
c) The id and name for all students living in either Cairo or Alex
d) The id and name for all students who are not living in Cairo or Alex

35. Select … from Employee where dept name = "Accounting"
Which of the following should be used to find the total salaries for the accounting department employees?

a) Mean(salary)
b) Sum(salary)
c) max(salary)
d) Count(salary)

Consider the following tables to answer questions from 36 to 40:

COURSE Table

CourseID	CourseName	Credits
C101	Math	3
C102	Physics	4
C103	English	2
C104	Computer	3
C105	History	2

STUDENT Table

StudentID	Name	DeptID
1	Ahmed	D1
2	Salma	D2
3	Youssef	D1
4	Mariam	

DEPARTMENT Table

DeptID	DeptName
D1	Computer
D2	Physics
D3	Literature

GREADES Table

StudentID	CourseID	Grade
1	C101	85
1	C102	78
2	C103	92
3	C101	80
4	C104	75

36. Which query lists departments that students enrolled in them?

a) SELECT DeptName FROM Departments WHERE DeptID IN (SELECT DeptID FROM Students);
b) SELECT DeptName FROM Departments JOIN Students ON Departments.DeptID = Students.DeptID;
c) Both A, C
d) A, C are not correct

37. SELECT Name FROM Students WHERE StudentID IN (SELECT StudentID FROM Grades WHERE Grade >= 80); What will this query return?

a) Ahmed, Salma, Youssef
b) Salma only
c) Ahmed and Salma
d) Ahmed, Salma, Mariam

38. SELECT S.Name, G.Grade FROM Students S LEFT JOIN Grades G ON S.StudentID = G.StudentID WHERE G.CourseID = 'C101'; What will this query return?

a) Students who didn't enroll in course C101
b) All students
c) Ahmed and Youssef with their grades
d) Mariam only

39. SELECT DeptName, COUNT(StudentID) FROM Students S JOIN Departments D ON S.DeptID = D.DeptID GROUP BY DeptName; What will this query return?

a) Number of departments
b) Total number of students
c) List of student names
d) Department name and number of students in each department

40. List student name, course name, and grade for the student who gets the maximum grade in a course.

a) Select Name, CourseName, Grade from Grades R join Course C on C.CourseID=R. CourseID join Student S on S.StudentID=R. StudentID and R.grade= (select max(grade) from Grades);
b) Select Name, CourseName, Grade from Student S, Course C, Grades R where R.StudentID= S.StudentID and C.CourseID=R. CourseID and grade= (max(grade) from Grade);
c) Select Name, CourseName, Grade from Grades R join Course C on C.CourseID=R. CourseID join Student S on Student S on S.StudentID and R.grade= max(grade);
d) Select Name, CourseName, Grade from Grades R where R.grade= (select max(grade) from Grades);

41. What will happen if you run the following SQL command without a WHERE clause?
UPDATE Employees SET salary = salary + 500;

a) Only one row will be updated
b) No rows will be updated
c) The query will result in an error
d) All rows in the Employees table will be updated

42. Which of the following is NOT a DDL constraint in SQL?

a) PRIMARY KEY
b) FOREIGN KEY
c) UPDATE
d) UNIQUE

43. What will the CHECK constraint do in this statement?
CREATE TABLE Products (Price DECIMAL(5,2), CHECK (Price > 0));

a) Makes Price unique
b) Prevents NULL values in Price
c) Ensures Price is less than 0
d) Ensures Price is always greater than 0

44. Short text, date, long text and number are all examples of what?

a) Headings
b) Records
c) Data types
d) Tables

45. How do you rename a table in MySQL?

a) ALTER TABLE old_name TO new_name
b) MODIFY TABLE old_name TO new_name
c) CREATE table old_name TO new_name
d) ALTER TABLE old_name RENAME TO new_name

46. To change student name "Khaled" into "Adam" in the "Name" column in the Student table?

a) UPDATE Student SET Name = 'Adam' WHERE Name = 'Khaled';
b) UPDATE Student SET Name = 'Khaled' as Name = 'Adam';
c) UPDATE Student SET Name = 'Khaled' into Name = 'Adam';
d) Modify Student SET Name = 'Khaled' into Name = 'Adam';

47. Which of the following SQL statements is correct?

a) SELECT Username and Password from Customers;
b) SELECT Username or Password from Customers;
c) SELECT Username, Password from Customers;
d) None of the above

48. What does this query return? SELECT MAX(Age) FROM Students;

a) Youngest student
b) Oldest student
c) Average age
d) Total age

49. Which SQL query uses a subquery correctly?

a) SELECT Name FROM Students WHERE Age > (SELECT AVG(Age) FROM Students);
b) SELECT AVG(Age) FROM Students WHERE Name;
c) SELECT Name FROM Students WHERE AVG(Age);
d) SELECT Name WHERE Age > AVG(Age);

50. What does this query return?

SELECT Name FROM Employees
WHERE Salary > ALL (SELECT Salary FROM Employees WHERE DeptID = 10);

a) Employees earning more than at least one employee in Dept 10
b) Employees earning more than every employee in Dept 10
c) Employees in Dept 10
d) Employees with maximum salary overall

End of Exam

Best Wishes **Dr. Marwa Hussien**

قسم الرياضيات كلية العلوم امتحان نهاية الفصل الدراسي الثاني ٢٠٢٥/٢٠٢٦ م	الفرقة : المستوي الثالث المادة : موضوعات مختارة في الرياضيات (١) رقم المقرر : ٣١٥ر	Department of Math. Faculty of Science الزمن: ٣ ساعات التاريخ : ٤ /٦/ ٢٠٢٦ م درجة الامتحان : (٥٠ درجه)

أجب عن خمسة أسئلة فقط مما ياتي: **(١٠ درجات لكل سؤال)**

(١-أ) باستخدم الصيغة التكاملية لدوال بسل $J_n(x)=\frac{1}{\pi}\int_0^{\pi}\cos(x\sin\theta-n\theta)d\theta$ أثبت أن:-

$$\int_0^{\infty} e^{-ax}J_\circ(bx)dx=\frac{1}{\sqrt{a^2+b^2}}$$

(ب) أثبت أن $U_n(x)$ حل لمعادلة تشيبشف التفاضلية : $(1-x^2)\frac{d^2y}{dx^2}-x\frac{dy}{dx}+n^2y=0$

(٢-أ) أثبت أن : $\beta(m,n)=\frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$

(ب) استخدم العلاقة في (أ) في إيجاد قيمة التكامل : $\int_0^2 x^4\sqrt[3]{8-x^3}\,dx$

(ج) أثبت أن:- $I=\int_0^{\infty} e^{-x^3}\sqrt{x}\,dx=\frac{1}{3}\sqrt{\pi}$

(٣-أ) باستخدام قانون التضاعف لدالة جاما أثبت أن : $\Gamma(\frac{5}{6})\{\Gamma(\frac{1}{3})\}^2=2\sqrt[3]{2}\sqrt{\frac{\pi^3}{3}}$

(ب) أوجد قيم التكاملات الآتية :- (i) $\int_0^{\infty}\frac{dx}{\sqrt[6]{x^5}\,(1+x)^2}$, (ii) $\int_0^4\frac{x^2}{\sqrt{4-x}}dx$

(٤-أ) إذا كانت $e^{\frac{x}{2}(t-\frac{1}{t})}=\sum_{n=-\infty}^{\infty}J_n(x)t^n$ هي الدالة المولدة لدوال بسل فأثبت أن :

$$(i)\,2J'_n(x)=J_{n-1}(x)-J_{n+1}(x)\,,\,(ii)\,\frac{2n}{x}J_n(x)=J_{n-1}(x)+J_{n+1}(x)$$

(ب) أثبت ان:-

$$(i)\,3J'_\circ(x)+J_3(x)-4J''_1(x)=0,\,(ii)\int_0^a x^3J_\circ(x)dx=a^3J_1(a)-2a^2J_2(a)$$

(٥-أ) أثبت أن:-

$$(i)\sqrt{1-x^2}\;U_n(x)=xT_n(x)-T_{n+1}(x)$$

$$(ii)(1-x^2)U'_n(x)=-n\,x\,U_n(x)+n\,U_{n-1}(x)$$

بقية الأسئلة في الخلف ←

قسم الرياضيات كلية العلوم امتحان نهاية الفصل الدراسي الثاني ٢٠٢٥/٢٠٢٦ م	الفرقة : المستوي الثالث المادة : موضوعات مختارة في الرياضيات (١) رقم المقرر : ٣١٥ر	Department of Math. Faculty of Science الزمن: ٣ ساعات التاريخ : ٤ /٦/ ٢٠٢٦ م درجة الامتحان : (٥٠ درجه)

أجب عن خمسة أسئلة فقط مما يأتي: **(١٠ درجات لكل سؤال)**

(١-أ) باستخدم الصيغة التكاملية لدوال بسل $J_n(x)=\frac{1}{\pi}\int_0^{\pi}\cos(x\sin\theta-n\theta)d\theta$ أثبت أن:-

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$$(i)\,2J'_n(x)=J_{n-1}(x)-J_{n+1}(x)\,,\,(ii)\,\frac{2n}{x}J_n(x)=J_{n-1}(x)+J_{n+1}(x)$$

(ب) أثبت ان:-

$$(i)\,3J'_{\circ}(x)+J_3(x)-4J''_1(x)=0,\,(ii)\int_0^a x^3J_{\circ}(x)dx=a^3J_1(a)-2a^2J_2(a)$$

(٥-أ) أثبت أن:-

$$(i)\sqrt{1-x^2}\;U_n(x)=xT_n(x)-T_{n+1}(x)$$

$$(ii)(1-x^2)U'_n(x)=-n\,x\,U_n(x)+n\,U_{n-1}(x)$$

بقية الأسئلة في الخلف ←

(ب) أثبت أن:-

$$\int_{-1}^{1} \frac{T_m(x)\,T_n(x)}{\sqrt{1-x^2}}\,dx = \frac{\pi}{2}, \quad m = n \neq 0$$

(٦-أ) أثبت أن:-

$$\int_{-1}^{1} P_n(x)\,P_m(x)\,dx = 0, \quad m \neq n$$

(ب) إذا كانت $(1-2xt+t^2)^{-\frac{1}{2}} = \sum_{n=0}^{\infty} t^n P_n(x)$ فأثبت أن :

$$(n+1)P_{n+1}(x) - (2n+1)\,x\,P_n(x) + n\,P_{n-1}(x) = 0$$

(ج) استخدم العلاقة السابقة في (ب) لدالة ليجندر في إثبات أن:-

$$\int_{-1}^{1} x\,P_{n-1}(x)\,P_n(x)\,dx = \frac{2n}{4n^2-1}$$

انتهت الأسئلة مع التمنيات بالتوفيق ,,,,,,,,,,,,,,,,

أ.د/ محمد عزب عبد الله & د/ أيمن شحاته

قسم الرياضيات
كلية العلوم

امتحان نهائي الفصل الدراسي الثانى
للعام الجامعي ٢٠٢٥/٢٠٢٦م
المقرر: تحليل عددي(٣٢٣ر)
الفرقة:المستوي الثالث الدرجة ٥٠ درجة
التاريخ : ١٤/ ٥/ ٢٠٢٦م

الزمن: ثلاث ساعات

Answer five questions only :- (10 marks for every question)

1-a) If the bisection algorithm is applied to a continuous function f on an interval $[a\,,b]$,with quantities $a_0, b_0, c_o, a_1, b_1, c_1$ and so on ,where $f(r)=0, f(a)f(b)<0$, then after n steps prove that:$|r-c_n| \le \frac{b_0-a_0}{2^{n+1}}$

1-b) Verify that when Newton's method is used to compute $\left(\frac{1}{a}\right), a \neq 0$. (by solving the equation $f(x)=\frac{1}{x}-a=0$) the sequence of iterates is defined by $x_{n+1}=x_n(2-a\,x_n)$ and show that this equation is quadratic convergence.

2-a))Approximate the following integral using the Simpson rule and find the error using the error formula and compare to the actual error.

$$\int_0^{0.2} \sqrt{1+x}\; dx\,, h=0.1\,.$$

2-b)Solve the following equation $x^3+4x^2-10=0 \quad \forall x \in [1\ ,\ 2]$ by using fixed point iteration [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 and find the actual error.

من فضلك انظر خلف الورقة .....

4-a) Solve the following system:

$8x - 3y + 2z = 20$

$6x + 3y + 12z = 35$ (Note: let $x^{(0)} = (0,0,0)$)

$4x + 11y - z = 33$

By using Gauss Seidel method (using three iterations only).

4-b)Derive Trapezoidal rule in the following formula :

$\int_{x0}^{x_1} f(x)dx = \frac{h}{2}[f(x_0) + f(x_1)] - \frac{h^3}{12}f''(\delta)$ where $h = x_1 - x_0$ and $x_0 < \delta < x_1$.

5-a) The Trapezoidal rule applied to $\int_0^2 f(x)dx$ gives the value 4, and Simpson's rule gives the value 2. What is $f(1)$?

5-b) **The following function values are exact values of an unknown polynomial :**

x	0	1	4	6
f(x)	1	-1	1	-1

Evaluate f (x) for x = 5 using Newton's formula for differences .

---

6) write the formula of the Newton forward divided difference formula , and use this formula to obtain a polynomial of least degree the fits the values shown :

x	0	1	2	3
$f(x)$	4	9	15	18

GOOD LUCK

DR.Mohamed A . Hussien

	Assiut University- Faculty of Science second Semester- Final Exam 2025-2026 Mathematic Department	Level : (3) Date: 21/5/2026 Time: 3 h	كلية العلوم جامعة أسيوط
Course Title: Operation Research (1)		Code: 326 Math	
Instructors: Prof. Dr. Mostafa Ali El khatteb			
Important:	No. of pages 2	No. Of questions 5	Total Mark:50 degree

Solve the Questions:

1) Factory makes two kinds of metal tanks A , B . Every kind passes in two machines. The first is to cut the sheet metal in 70 hours weekly, the second is for folding sheets in 60 hours weekly, The first kind "A" needs 4 hours in the first machine and 10 hours in the second machine. The second kind "B" needs 5 hours in the first machine and 6 hours in the second machine. Writ the model of the linear programming which makes the highest profit if the profit of "A" is 3 $ and the profit of "B" is 6 $.and solve the model by the Algebraic method

2) (a) To find the optimal solution of Model of linear programming the next by

the Graphical Method

Min $Z = 5x_1 + 7x_1$

S.t $x_1 + 2x_2 \leq 20$, $4x_1 + 3x_2 \leq 60$, $3x_1 + x_2 \leq 15$ $x_1, x_2 \geq 0$

(b) Writ dual of following liner problem

$Min \quad z = -x_1 + 7x_{2+}10x_3$

S.t $-x_1 + x_2 + x_3 \geq 3$ $-x_3 + x_2 + 2x_3 + x_4 \geq 5$

$x_1, x_2, x_3, x_4 \geq 0$

3) Solution of this model by Simplex method

$Min \quad z = 4x_1 + 3x_{2+}6x_3$

$S.t$ $x_1 + x_3 \geq 2$ $x_2 + x_3 \geq 5$ $x_1, x_2, x_3 \geq 0$

4) (a) solution of this model by Simplex method this problem and find solution of dual linear problem form the solution.

$Max \quad z = 2x_1 + 5x_2$

S.t $\quad 3x_1 + 5x_2 \leq 8 \quad , \quad 2x_1 + 7x_2 \leq 12 \quad , \quad x_1, x_2 \geq 0$

(b) find the first table of big – M Simplex method this problem

$Min \quad z = 2x_1 + 3x_2$

S.t $-2x_1 + 3x_2 = 3 \quad 4x_1 + 5x_2 \geq 10 , \quad x_1 + 2x_2 \leq 5 \quad , \quad x_1, x_2 \geq 0$

5) If the solution of this model by Simplex method this problem

Max $\quad z = 5x_1 + 3x_2$

S.t $\quad x_1 - x_2 \leq 2 \quad 2x_1 + x_2 \leq 4 \ , \ -3x_1 + 2x_2 \leq 6$

$x_1, x_2 \geq 0$ Is

Basic variable	x_1	x_2	S_1	S_2	S_3	solution
S_1	0	0	1	1/7	3/7	36/7
x_1	1	0	0	2/7	-1/7	2/7
x_2	0	1	0	3/7	2/7	24/7
z	0	0	0	19/7	1/7	82/7

Discuss sensitivity Analysis

End of Exam

Best Wishes

Prof. Dr. Mostafa El-kahteeb
Prof. Dr. Taha El Gindy

Second Term Exam – Academic Year 2025/2026

Course Name: Computer Networks — **Duration: 2Hour**

Course Code: MC354 — **Date: 6/6/2026**

Level 3 — **Total Marks: 50**

Answer the Following Questions: **(50 marks)**

I. Complete the following statements from the given table. **(20 marks)**

***Note*: each answer may be used several times.**

1	Application	6	ISP	11	Protocol	16	Network
2	Routing	7	Transport	12	Cache	17	Switching
3	Server	8	Throughput	13	L/R	18	RTT
4	UDP	9	Socket	14	Cookies	19	d/s
5	Client	10	HTTP	15	Forwarding	20	No answer

a. ..... define the format, order of messages sent and received among network entities, and actions taken on message transmission, receipt. ( )

b. When data are transmitted from device A to device B, the header from A's layer **3** is read by B's ..... layer. ( )

c. The TCP/IP ..... layer is equivalent to the combined session, presentation, and application layers of the OSI model. ( )

d. ..... layer deals with process-process data transfer. ( )

e. ..... determine source-destination paths taken by packets. ( )

f. Hosts connect to Internet via access ..... ( )

g. In packet ....., hosts break application-layer messages into packets. ( )

h. .....transport protocol commonly used for video streaming. ( )

i. .....may have dynamic IP addresses. ( )

j. ..... process: process that initiates communication. ( )

k. ..... tracking a user's browsing behavior. ( )

l. .....satisfy client requests without involving origin server. ( )

m. process receives messages from its ..... ( )

n. ..... time for a small packet to travel from client to server and back. ( )

o. ..... has permanent IP address. ( )

p. The formula for transmission delay is d_trans =. ( )

q. The formula for propagation delay is d_prop = ... ( )

r. ..... is unreliable data transfer protocol between sending and receiving process. ( )

s. ..... is web's application-layer protocol ( )

t. .....rate at which bits are being sent from sender to receiver. ( )

II. **Write (√) OR (X) the brackets for the following:** **(20 marks)**

( )	1. In BitTorrent, peers are intermittently connected and change IP addresses
( )	2. In packet switching, the resources needed along a path to provide for communication between the end systems are reserved for the duration of the communication session.
( )	3. Queueing delay depends on congestion level of router.
( )	4. TCP protocol does not provide flow control.
( )	5. The port number in the process identifier is used to distinguish different processes on the same host.
( )	6. host device has unique 64-bit IP address.
( )	7. The traceroute program sends packets with increasing TTL values to measure delays along a network path.
( )	8. Persistent HTTP requires 2 RTTs per object
( )	9. IP spoofing means injection of packet with false source address
( )	10. PUT method completely replaces file that exists at specified URL with content in entity body of POST HTTP request message.
( )	11. The OSI model has five layers, which is the same number as the Internet protocol stack
( )	12. HTTP response status code 400 means requested document not found on this server.
( )	13. Circuit switching shares resources dynamically among users.
( )	14. IP spoofing involves injecting a packet with a false source address to disguise its origin.
( )	15. Identifier includes both IP address and port numbers associated with process on host.
( )	16. Transport Layer Security (TLS) provides encrypted TCP connections, including data integrity and end-point authentication.
( )	17. HTTP response status code 400 OK indicates that the request succeeded and the requested object is in the response.
( )	18. The HTTP HEAD method returns only the response headers without the actual object/body.
( )	19. Forwarding move arriving packets from router's input link to appropriate router output link.
( )	20. Processes in different hosts communicate by exchanging messages.

III. **The text below shows the reply sent from the server:** **(10 marks)**

1) Was the server able to successfully find the document or not?
2) What time was the document reply provided?
3) When was the document last modified?
4) How many bytes are there in the document being returned?
5) Did the server agree to a persistent connection?

```
HTTP/1.1 200 OK<cr><lf>Date: Tue, 07 Mar 2008
12:39:45GMT<cr><lf>Server: Apache/2.0.52 (Fedora)
<cr><lf>Last-Modified: Sat, 10 Dec2005 18:27:46
GMT<cr><lf>ETag: "526c3-f22-a88a4c80"<cr><lf>Accept-
Ranges: bytes<cr><lf>Content-Length: 3874<cr><lf>
Keep-Alive: timeout=max=100<cr><lf>Connection:
Keep-Alive<cr><lf>Content-Type: text/html; charset=
ISO-8859-1<cr><lf><cr><lf><!doctype html public "-
//w3c//dtd html 4.0transitional//en"><lf><html><lf>
<head><lf> <meta http-equiv="Content-Type"
content="text/html; charset=iso-8859-1"><lf> <meta
name="GENERATOR" content="Mozilla/4.79 [en] (Windows NT
5.0; U) Netscape]"><lf> <title>CMPSCI 453 / 591 /
NTU-ST550ASpring 2005 homepage</title><lf></head><lf>
<much more document text following here (not shown)>
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End of Questions

Good Luck

Faculty of science

Department of Mathematics

Final Term Exam (2nd Term)

Third-year student (Math)

Course: Real Analysis I

Code: 312 M

Time : 3 Hours

Points : 50 Points

Date: Saturday, 6 June 2026

Assiut University

The exam consists of two pages and includes five questions. Answer all of them

Q1-a) Complete the following statements by filling in the blanks: (5 Points)

1) The value of $\lim_{n\to\infty}\left(1+\frac{1}{n}\right)^{\frac{n}{2}} =$ ……

2) The closure of the set $\bigcup_{n=1}^{\infty}[2+\frac{1}{n}, 5-\frac{1}{n}]$ is ……

3) The least upper bound of the set $\left\{\frac{1}{m}+\frac{1}{n}: m,n \in \mathbb{N}\right\}$ is ……

4) Any non-empty subset of $\mathbb{R}$ that is bounded below must have ……

5) The list of all possible rational zeros of $p_3(x) = 3x^3 + 2x^2 + 3x + 2$ is ……

Q1-b) Match the items in column I with those in column II and select the correct answer using the codes given below each column: (5 Points)

Column I	Column II
1) $a_1 = 1, a_2 = 2, a_n = \frac{1}{2}(a_{n-1} + a_{n-2})\ \forall\ n > 2$	a) 2
2) $(1, -1, -2, \ldots\ldots)$	b) 1
3) $(1, 2, 3, \ldots\ldots)$	c) Monotonically decreasing
4) $\overline{\lim}_{n\to\infty}(-1)^n\left(1+\frac{1}{n}\right) =$	d) Monotonically increasing
5) $\underline{\lim}_{n\to\infty}\left(3+(-1)^n+\frac{1}{n}\right) =$	e) Cauchy

Q2) Classify the following statements as true or false: (10 Points)

1) The set $\mathbb{Q}^c$ is countable.

Please Turn the Page

2) The set $\mathbb{R} \setminus \mathbb{Z}$ is an open subset of $\mathbb{R}$.

3) The limit supremum of the sequence $(-1)^n$ exists.

4) The set $\mathbb{Q}$ is a neighborhood of each of its points.

5)The derived set A' of the set $A = \left\{x \in \mathbb{R} : x = \frac{1}{n},\ n \in \mathbb{N}\right\}$ is φ.

6) The closure $\bar{A}$ of the set $A = \cap_{n=1}^{\infty}\left[-\frac{1}{n}, \frac{1}{n}\right]$ is a closed subset of $\mathbb{R}$.

7) The function $f: \mathbb{R} \to \mathbb{R},\ f(x) = \sin x$, is uniformly continuous on $\mathbb{R}$.

8) The function $f: \left(-\frac{\pi}{2}, \frac{\pi}{2}\right) \to \mathbb{R},\ f(x) = \tan x$, is bounded on its domain.

9) There exist integers $p, q \in \mathbb{Z}$, with $gcd\,(p, q) = 1$ and $q \neq 0$, such that $\frac{p}{q} = 23.\overline{43}$.

10) The function $f: \mathbb{R} \to \mathbb{R},\ f(x) = \begin{cases} 1, & x \in \mathbb{Q} \\ 0, & x \notin \mathbb{Q} \end{cases}$ is continuous at every point of $\mathbb{R}$.

Q3-a) Evaluate the following limits: **(6 Points)**

1) $\lim_{n\to\infty}(2^n + 3^n)^{\frac{1}{n}}$ 2) $\lim_{n\to\infty}\frac{\cos^2 n}{3^n}$ 3) $\lim_{n\to\infty}\sqrt{n}\left(\sqrt{n+1} - \sqrt{n-1}\right)$

Q3-b) Show that: $\lim_{n\to\infty}\sqrt[n]{x} = 1,\ x > 0$. **(4 Points)**

Q4-1) Show that $0.7(\pi - 3.1415) \in \mathbb{Q}'$. **(3 Points)**

2) Demonstrate that the sequence $a_n = \sum_{k=1}^{n}\frac{(-1)^{k+1}}{k!}$ is a Cauchy sequence. (3 points)

3) Use mathematical induction to show that the sequence $a_{n+1} = \sqrt{2a_n},\ a_1 = 1$ is increasing and bounded. Hence, determine its limit. **(4 points)**

Q5-1) Use a sequential argument to show that $\lim_{x\to 0}\sin\frac{1}{x}$ does not exist.**(3 Points)**

2) Apply the discontinuity criterion to determine whether $f(x) = x^2$ is uniformly continuous on $\mathbb{R}$. **(3 Points)**

3) Discuss the differentiability of $f(x) = |x|^3$ on $\mathbb{R}$. **(4 Points)**

Prof. Dr. A. M. Saddeek – Best wishes. *Signature: A. M. Saddeek*

2 Hours- 50 Points	Final Exam	Arab Republic of Egypt
2st term 2025-2026	3rd Level – Artificial Intelligence	Assiut University
22/5/2026	MC 352	Faculty of Science

Answer the following questions:

Question One: Check if the following statements True or False **(2 points each)**

1- CI is the study of adaptive mechanisms to enable or facilitate intelligent behavior in complex and changing environments ( )
2- In annealing, the material is cooled quickly after being heated. ( )
3- In the search algorithms: *Grids*, the interior is the set of nodes that have been expanded ( )
4- The simulated annealing algorithm may continue searching even after rejecting a solution. ( )
5- In the SA algorithm, If $T = 0$, worse moves are accepted. ( )
6- In *8-Queen* problem the number of possible sequences to investigate is 1.8*10^14 ( )
7- In the SA algorithm, Linear cooling subtracts a fixed value from the temperature. ( )
8- The aim of GA is to evolve computer programs ( )
9- If the crossover point is at the end, no exchange occurs. ( )
10- Sensors are used by agents to act on the environment. ( )

Put your answer of Question One here:									
1	2	3	4	5	6	7	8	9	10

Question Two: Choose the correct answer: **(2 points each)**

11- What is the first step in the SA algorithm?
A. Reduce the temperature
B. Generate a random solution
C. Accept the solution
D. Generate X' from X.

12- Suppose: $\Delta f = -4, T = 40$, according to the SA acceptance rule, what is the probability of acceptance?
A. 1
B. $e^{-\frac{4}{40}}$
C. -1
D. $e^{\frac{4}{40}}$

13- In geometric cooling, the value of α must satisfy:

A. $\alpha > 1$
B. $\alpha = 0$
C. $0 < \alpha < 1$
D. $\alpha < 0$

14- The main difference between Genetic Algorithms (GAs) and Genetic Programming (GP) is in:
A. Population size
B. Representation scheme
C. Mutation rate
D. Cooling schedule

15- If the subtree: $(/\ x\ (/\ 1\ x))$ is simplified mathematically, the result becomes:
A. x
B. x^2
C. $1/x$
D. $2x$

16- Which of the following doesn't represent a tree?
A. $*\ 3\ -\ x\ y$
B. $-\ y\ /\ x\ 3$
C. $+\ x\ /\ y\ 4$
D. $*\ *\ x\ x\ -\ 4$

17- The original Holland GA used:
A. Tree representation
B. Graph representation
C. Bit string representation
D. Matrix representation

18- Which selection method was used in the original Holland GA?
A. Tournament selection
B. Random selection
C. Proportional selection
D. Greedy selection

19- Mutation in a Genetic Algorithm is mainly used to:
A. Reduce population size
B. Introduce diversity
C. Stop convergence
D. Replace crossover

20- Convert the binary number: 1011 to Gray code.
A. 1110
B. 1010
C. 1101
D. 1001

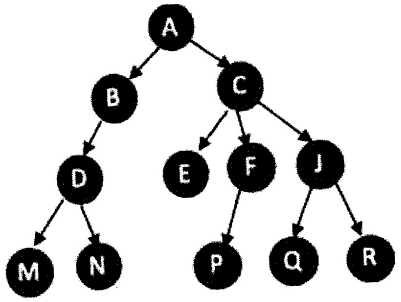
21- Apply uniform crossover. Suppose: Parent 1: 110011, Parent 2: 001100, Mask: 101010. What are Offsprings 1, 2 ?
A. 100010, 101100
B. 100111, 001111

C. 001100, 110011
D. 011001, 100110

22- Which field studies the nature of the mind and thinking?

A. Biology
B. Philosophy
C. Mathematics
D. Computer Science

23- Based on the given tree, what is the sequence of node expansions that a Depth-First Search (DFS) algorithm would follow to reach node ***J*** starting from node ***A***?"



A. ABDMNCEFPJ
B. ABCDEFJ
C. ACJ
D. ABCDEF

24- Based on the given tree, what is the sequence of node expansions that a Breadth-First Search (BFS) algorithm would follow to reach node ***J*** starting from node ***A***?"

A. *ABDMNCEFPJ*
B. *ABCDEFJ*
C. *ACJ*
D. *ABCDEF*

25- Suppose a chromosome is: [5,8,4,9]. If each gene represents one parameter, how many optimization parameters are represented?

A. 5
B. 8
C. 4
D. 9

Put your answer of Question TWO here:

11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

Best wishes *End of Questions* *Dr. Amal Abdelazim*

كلية الهندسة — كلية العلوم جامعة أسيوط — جامعة أسيوط

Course	Electronic Circuits (1)	Time Allowed	3h	Date of Exam	May 2026
Code	EE 326	Exam	Final	Total Mark	50

- **Please, attempt all questions**
- **The exam consists of (4) questions in (5) different pages.**

Q1) (20 Points) Choose the correct answer and put your selection in the table below.

Statement	1	2	3	4	5	6	7	8	9	10
Answer										

1. In Fig. 1, the output is … … (a) -1.2 V (b) 1.2V (c) 1.05V (d) -1.05V
2. In Fig. 2, the output is … … (a) -1.2 V (b) 1.2V (c) 1.05V (d) -1.05V
3. In Fig. 3, the output is … … (a) 10 V (b) -10V (c) 21V (d) -21V
4. In Fig. 4, the output is … … (a) 4 V (b) -4V (c) 8V (d) -8V
5. In Fig. 5, the output is … … (a) 6 V (b) -6V (c) 9V (d) -9V
6. In Fig. 6, assuming $R_1 = R_2 = R$ and $C_1 = C_2 = C$. The frequency of oscillation f_o is calculated as ….. (a) $\frac{1}{2\pi R_3 C}$ (b) $\frac{1}{2\pi R_4 C}$ (c) $\frac{2\pi}{RC}$ (d) $\frac{1}{2\pi RC}$
7. In Fig. 6, assuming $R_1 = R_2 = R$ and $C_1 = C_2 = C$. The op-amp must provide a gain of ≥ ….. (a) 1 (b) 2 (c) 3 (d) 0
8. In Fig. 7, $R_1 = 2.2\text{k}\Omega$, $R_2 = 4.7\text{k}\Omega$, and $C_1 = 0.022\mu\text{F}$. The frequency of oscillation f_r =…… . kHz. (a) 5.64 (b) 6.54 (c) 4.56 (d) 2
9. In Fig. 7, $R_1 = 2.2\text{k}\Omega$, $R_2 = 4.7\text{k}\Omega$, and $C_1 = 0.022\mu\text{F}$. The duty cycle is calculated as…… . %. (a) 59.5 (b) 49.5 (c) 39.5 (d) 2
10. In Fig.8, The duration of the output pulse T = …..(a) $1.1R_2C_1$ (b) $1.1R_2C_2$ (c) $1.1R_1C_2$ (d) $1.1R_1C_1$

2. Deduce the bilinear (Mobius) transformation which maps the points $z=0,\ -i,\ -1$ into $w=i,\ 1,\ 0$.
3. Prove that the function $f(z)=\begin{cases}\dfrac{x^3(i+1)-y^3(1-i)}{x^2+y^2}, & z\neq 0\\ 0, & z=0\end{cases}$ satisfies Cauchy–Riemann equations at $z=0$ but it is not analytic function at $z=0$.
4. Applying the contour integration, evaluate the integral $\int_0^{\infty}\frac{x^2}{(x^2+1)^2}dx$.

Question Four: (10 marks = 2+2+2+2+2)

1. Find the image of the region $\{z=x+iy:1\le y\le 2\}$ under the complex mapping $w=z^2$, and illustrate this with a drawing.
2. Show that $f(z)=\begin{cases}\dfrac{z\,\mathrm{Re}(z)}{|z|}, & z\neq 0\\ 0, & z=0\end{cases}$ is continuous at $z_0=0$ and is not differentiable at $z_0=0$.
3. Expand the Laurent series of the function $f(z)=\dfrac{1}{z(z-2)}$ in $D:1<|z-2|<2$, and $\oint_D f(z)dz$.
4. Using Cauchy's residue theorem, calculate the integral $\oint_C \frac{e^{2z}}{z^2(z^2+1)}dz; C:|z+i|=\frac{1}{2}$
5. Evaluate the integral $\int_C zdz$, where C is the straight line from z=1 to z=i.

Question Five: (10 marks)

Classify each of the following statements as true (√) or false (X).

1. The domain of the function $f(z)=e^{z^2-(1+i)z+2}$ is all complex numbers
2. If f is a complex function for which $\lim_{z\to 2+i}\mathrm{Re}(f(z))=4$ and $\lim_{z\to 2+i}\mathrm{Im}(f(z))=-1$, then $\lim_{z\to 2+i}f(z)=4-i$
3. If a complex function $f(z)$ is differentiable at point z, then $f(z)$ is analytic at z.
4. The function is $f(z)=\dfrac{y}{x^2+y^2}+i\dfrac{x}{x^2+y^2}$ differentiable for all $z\neq 0$.

Please turn the page