

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

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

41. status code: 404 Not Found

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

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

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

43. DNS is the abbreviation of

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

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

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

45. Reliable data transfer is available at

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

46. Unreliable data transfer is available at

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

47. transport layer: communication between

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

48. network layer: communication between

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

49. TCP socket identified by

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

50. ___ demultiplexing using destination port number (only)

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

26. examples of clients server

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

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

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

28. applications with P2P architectures have ____

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

29. identifier includes ____ associated with process on host.

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

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

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

31. meaning of information in fields

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

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

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

33. What does SMTP stand for?

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

34. HTTP: hypertext transfer protocol include

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

35. HTTP uses

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

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

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

37. Non-persistent HTTP response time =

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

38. types of HTTP messages ____

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

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

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

13. Which layer of the OSI model is responsible for routing of packets across a network?
A) Application Layer B) Presentation Layer C) Network Layer D) Physical Layer

14. Which of the following best defines 'packet sniffing' in network security?
A) Encrypting packets for secure transmission.
B) Discarding suspicious network packets.
C) Capturing and analyzing packets traveling over a network.
D) Increasing the speed of packet transmission.

15. What is the primary function of a firewall in a network?
A) To increase data transmission speeds.
B) To prevent unauthorized access to or from a private network.
C) To store data centrally for network users.
D) To provide a user interface for network management.

16. How many layers are present in the Internet protocol stack (TCP/IP model)?
A) 7 B) 5 C) 6 D) 10

17. Which is not a Transport layer protocol?
A) UDP B) SMTP C) TCP D) all of above

18. Which Link layer protocol?
A) UDP B) Ethernet C) TCP D) all of above

19. The packet of information at the application layer is called _____.
A) Message B) Packet C) Segment D) all of above

20. Which technology is used for encapsulating network layer datagrams into link-layer frames?
A) TCP/IP B) DNS C) Link-layer protocols like Ethernet or WiFi.
D) Application-layer protocols like HTTP or FTP.

21. Which layer of the OSI model is responsible for ensuring error-free transmission of data?
A) Application Layer B) Presentation Layer C) Session Layer D) Data Link Layer

22. What role does the Session Layer play in the OSI model?
A) It is responsible for physical data transfer. B) It encrypts and compresses data.
C) It manages the connection and maintains sessions. D) all mentioned

23. What is the main function of the Presentation Layer in the OSI model?
A) It provides end-to-end data transport services.
B) It translates, encrypts, and compresses data.
C) It manages data packets between multiple networks.
D) It controls the physical hardware used for data transmission.

24. What is network apps from these?
A) social networking and text messaging B) Web and e-mail C) No correct answer D) A and B

25. Which one of the following is an architecture paradigms?
A) Peer to peer B) Client-server C) HTTP D) Both Peer-to-Peer & Client-Server

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

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

- 2- A region of space has a potential step such that particles have a wave function given by:

$$\psi(x,t) = \begin{cases} \frac{9a}{\sqrt{2}} e^{i(kx-\omega t)} + \frac{6a}{\sqrt{2}} e^{i(-kx-\omega t)} & x < 0 \\ \frac{8a}{\sqrt{2}} e^{i(\alpha x-\omega t)} & x > 0 \end{cases}$$

The particles are initially travelling in the positive x direction.

- (a) **What fraction** of the incident particles will be **reflected and transmitted**?
 (b) Give the value of α/k .

- 3- Solve the harmonic oscillator by the method of the lowering and raising operators, which are defined as the Linear combination of the momentum and position :

$$\hat{a}_{\pm} = \frac{1}{\sqrt{2m\hbar\omega}} (\mp i \hat{p} + m\omega x)$$

- (a) **Prove** $\hat{H} = -\frac{\hbar^2}{2m} \frac{d^2}{dx^2} + \frac{1}{2} m\omega^2 x^2 = \hbar\omega (\hat{a}_- \hat{a}_+ - \frac{1}{2}) = \hbar\omega (\hat{a}_+ \hat{a}_- + \frac{1}{2})$.
 (b) **Show that if** $\hat{H}\psi = E\psi$, then $\hat{a}_{\pm}\psi$ is also **eigenfunction** with **eigenenergy** $E \pm \hbar\omega$.

- 4- The function $\psi(x,0) = A \left(\frac{x}{L}\right)^2 \left[1 - \left(\frac{x}{L}\right)\right]$ is an acceptable wave function for the particle in a one-dimensional infinitely deep box of length L .

- (a) **Calculate** the normalization constant A .
 (b) **Calculate** the average values of x and x^2 for this state, and use these to **calculate** the standard deviation, $\sigma_x = \sqrt{\langle x^2 \rangle - \langle x \rangle^2}$.

**** Good Luck ****

Prof. Dr. A. A. Ebrahim

$$(iii) i\hbar \frac{\partial \psi}{\partial t} = -\frac{\hbar^2}{2m} \frac{\partial^2 \psi}{\partial x^2} + kx^2 \psi$$

11- Which of the following can be a wave function?

(i) $\tan x$

(ii) $\sin x$

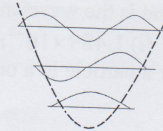
(iii) $\cot x$

12- Which device is shown in the following figure?

(i) particle in a Box

(ii) harmonic Oscillator

(iii) atomic spectroscopy



13- The ground state energy of a simple harmonic oscillator is equal to:

(i) $\frac{1}{2} \hbar \omega$

(ii) $\frac{3}{2} \hbar \omega$

(iii) $\frac{5}{2} \hbar \omega$

14- An electron in a 4S state has which of the two values?

(i) $\ell = 4, n = 1$

(ii) $n = 4, \ell = 0$

(iii) $n = 4, \ell = 2$

15- Which of the following is not a characteristic of wave function?

(i) continuous

(ii) single valued

(iii) physically Significant

16- In the Schrodinger equation $\hat{H}\Psi = E\Psi$, where Ψ represents the:

(i) momentum operator

(ii) wave function for the system

(iii) probability density

17- The kinetic energy of a particle of mass m moving in the y -direction with momentum p_y

is $\frac{p_y^2}{2m}$. The kinetic energy operator for this model is:

(i) $-\frac{\hbar^2}{2m} \frac{\partial^2}{\partial y^2}$

(ii) $\frac{\hbar^2}{2m} \frac{\partial^2}{\partial y^2}$

(iii) $-\frac{\partial^2}{\partial y^2}$

18- If the kinetic energy of a free electron doubles, its de Broglie wavelength changes by the factor:

(i) 2

(ii) $\frac{1}{2}$

(iii) $\frac{1}{\sqrt{2}}$

19- The Potential energy of harmonic oscillator is $V(x) = \dots\dots\dots$

(i) $\frac{1}{2} m \omega x$

(ii) $\frac{1}{2} m \omega^2 x^2$

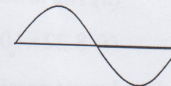
(iii) $\frac{p^2}{2m}$

20 - The wave function for which quantum state n is shown in the figure?

(i) 1

(ii) 2

(iii) 3



Part II : Answer the following questions

(30 Marks)

1- The normalized wave function of a particle moving along x -axis has the form:

$$\psi(x) = \begin{cases} x + \beta, & -\beta < x < 0, \\ -x + \beta, & 0 < x < \beta \end{cases}$$

Find the value of β and the probability that the particle positions between $x = \beta/3$ and $x = \beta$.



ASSIUT UNIVERSITY
Faculty of Science
Quantum Mechanics 1, P 311
Final Exam (50%)



September 03, 2025

Duration: 9:00-12:00

Part I: Chose the correct answer for the following questions: (20 Mark)

1- What is the wavelength of radiation which has a frequency of $4.464 \times 10^{14} \text{ s}^{-1}$?

- (i) $1.489 \times 10^{-6} \text{ m}$ (ii) $1.338 \times 10^{23} \text{ m}$ (iii) $671.6 \times 10^{-9} \text{ m}$

2- For a particle in a one-dimensional box, the wave function is given by:

$$\psi(x) = N \sin \frac{3\pi x}{2L} \quad \text{for } -L < x < L$$

The normalization constant N is given by:

- (i) $\frac{1}{\sqrt{L}}$ (ii) $\sqrt{\frac{2}{L}}$ (iii) $\frac{2}{L}$

3- What is the energy of the level corresponding to $n = 4$ ($-L < x < L$)?

- (i) $\frac{2\pi^2 \hbar^2}{mL^2}$ (ii) $\frac{8\pi^2 \hbar^2}{mL^2}$ (iii) None of the above

4- Using the function $\psi(x) = \frac{x}{3}$, the probability of finding the particle between $x = 1, 2$ equals:

- (i) 3.86 (ii) 0.26 (iii) 4/9

5- A free electron has a wavefunction $\psi(x)$ where x is measured in meters:

$$\psi(x) = A \sin (5 \times 10^{10} x)$$

The electron's wave number, k (where $\pi = 3.15$) equals:

- (i) $5 \times 10^{10} \text{ m}^{-1}$ (ii) $2 \times 10^{-11} \text{ m}^{-1}$ (iii) $1.26 \times 10^{-10} \text{ m}^{-1}$

6- The electron's momentum, p (where $\hbar = 1.054 \times 10^{-34} \text{ Js}$) in point (5) equals:

- (i) $5.27 \times 10^{-24} \text{ kg m/s}$ (ii) $5.29 \times 10^{24} \text{ kg m/s}$ (iii) $8.35 \times 10^{-35} \text{ Js} \cdot \text{m}$

7- The electron's kinetic energy in electron volts (where $m_e = 9.11 \times 10^{-31} \text{ kg}$) in point (5) equals:

- (i) $1.52 \times 10^{-17} \text{ eV}$ (ii) 95 eV (iii) $1.05 \times 10^2 \text{ eV}$

8- A proton is confined to moving in a one-dimensional box of width $2 \times 10^{-10} \text{ m}$.

(a) The lowest possible energy of the proton (where $m_p = 1.67 \times 10^{-27} \text{ kg}$) equals:

- (i) $8.22 \times 10^{-22} \text{ J}$ (ii) $2.11 \times 10^{-22} \text{ J}$ (iii) $5.13 \times 10^{-3} \text{ J}$

9- The lowest possible energy of an electron confined to the same box? ($m_e = 9.1 \times 10^{-31} \text{ kg}$)

- (i) 9.40 J (ii) $1.5 \times 10^{-18} \text{ J}$ (iii) $3.15 \times 10^{-18} \text{ J}$

10- Which of the following is the correct expression for the Schrödinger wave function for the Harmonic Oscillator?

- (i) $i\hbar \frac{\partial \psi}{\partial t} = -\frac{\hbar^2}{2m} \frac{\partial^2 \psi}{\partial x^2} + \frac{1}{2} kx \psi$ (ii) $i\hbar \frac{\partial \psi}{\partial t} = -\frac{\hbar^2}{2m} \frac{\partial^2 \psi}{\partial x^2} + \frac{1}{2} kx^2 \psi$

Answer Only Five Questions of the Following

- 1) A) Derive **Newton Raphson** formula to find the approximate root of an algebraic equation $f(x) = 0$ around $x_0 = 0$.
B) Use the formula obtained in (a) to solve $x^5 - x - 1 = 0$ around $x_0 = 1$ and impose 4 iterations.

- 2) A) Derive **Lagrange** formula to interpolate the points $(x_i, y_i), i = 0, 1, 2, \dots, n$, and put it in the canonical form.

B) Use the formula obtained in (a) to find $y(3)$, via the following data

x	1	2	4
y	2.1	5.2	17.4

- 3) A) Derive **Trapezoidal** formula to numerically approximate the definite integral $\int_{x_0}^{x_n} f(x) dx$.

B) Use the formula (a) to find an approximate value of $\int_0^1 \frac{1}{x^2+1} dx$, for

$$h = 0.1.$$

- 4) A) State **Runge Kutta's** formula of (order 2) for solving the initial value problem $y' = f(x, y)$ subject to the initial condition $y(x_0) = y_0$

B) Use Runge Kutta of order 2 iteration to find $y(0.2)$ for $h = 0.1$

$$y' = x + y, \quad y(0) = 1.$$

- 5) A) Derive **Newton Forward** formula to interpolate the points $(x_i, y_i), i = 0, 1, 2, \dots, n$.

B) Use the formula obtained in (a) to find $y(2)$, via the following data

x	1	3	5
y	12	15	22

- 6) A) Let $f(x) = x^3$, find the following **divided differences** for a, b, c , and $d \in R$

i) $[a, b]$, ii) $[a, b, c]$, iii) $[a, b, c, d]$

B) Use Newton divided difference method to interpolate $y(3)$ via the following data

x	1	2	5	7
y	4	12	20	33

Best wishes Dr. Sayed A. Dahy

Question 2 14 Marks

- i) Check if the jump will occur or not in the following cases: (6 Marks)
(Note: answer with occur or not occur, and also write the reason)

a) MOV AX,32B7H CMP AX,9A2DH JG NEXT	b) MOV AL,0F5H ADD AL,41H JC NEXT	c) MOV CX,5 DEC CX JCXZ NEXT
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- ii) Show the contents of BX and the flag bits (CF, ZF, SF, OF, PF and AF) after the execution of the following assembly lines: (8 Marks)

```
MOV BH,23H
ADD BH,89H
CMC
MOV BL,0C8H
SBB BL,43H
```

Question 3 16 Marks

- i) Suppose that AL = 00011000 B. Using only logical instructions, write the assembly lines to perform the following operations, and then show the contents of AL: (8 Marks)

- | | |
|--------------------------------------|---|
| a) Multiply AL by 4 | b) Divide AL by 8 |
| c) Set the bits No. 0, 3 and 5 in AL | d) Toggle the bits No. 2, 4 and 7 in AL |

- ii) Write the assembly code that: (6 Marks)

- initializes AL, BL, CL, and DL as follows:

AL = 2F H BL = 10 H CL = 0D H DL = 34 H

- performs the following logical expression:

$$x = (A \text{ AND } \overline{B}) \text{ XOR } (\overline{C} \text{ AND } D)$$

where A = AL, B = BL, C = CL, and D = DL (Note: $\overline{\square}$ = 1's complement of $\square$)

- stores the result x in AL

then show the contents of AL after the execution of the assembly code. (2 Marks)

Question 4 10 Marks

Write the assembly code that: (8 Marks)

- adds and counts the even and odd numbers in the following series of byte size data: 37, 62, 28, 51, 46, 14, 72, 111 and 0
- stores the sum and count of the even numbers in CL and CH, respectively
- stores the sum and count of the odd numbers in DL and DH, respectively
- stops when the number 0 is read

then show the contents of CX and DX after the execution of the assembly code. (2 Marks)



Mathematics Department
Faculty of Science
Assiut University
Summer Semester - 2024/2025

4th Year

Final-term Exam

Computer Science Program

Course Code: ٥٣٢٥

Microprocessors

(معالجات دقيقة)

Date: August 28th, 2025

Time: 9:00 am - 11:00 am (2 hours)



Important Notes: Marks: 50, Number of Pages: 2, Number of Questions: 4

Answer All the Following Questions:

Question 1 10 Marks

Choose the correct answer to each of the following questions:
(Note: multiple choices are not allowed)

(1 Mark for Each Point)

- The bus selects the memory or I/O device and causes them to perform a read or write operation.
☐ A data ☐ B control ☐ C address ☐ D non of the previous
- Consider $DS = 3000H$, the ending address of the data segment is
☐ A 2FFFFH ☐ B 32FFFH ☐ C 3FFFFH ☐ D 32000H
- The first microprocessor in Intel which has 32-bit address bus and 64-bit data bus is
☐ A Intel 80386 ☐ B Intel 80486 ☐ C Intel Pentium ☐ D Intel Pentium Pro
- The main processing unit in Intel 8086 which contains the IP register is
☐ A BIU ☐ B ALU ☐ C EU ☐ D non of the previous
- The maximum size of a memory segment in the real mode is
☐ A 1 MB ☐ B 64 KB ☐ C 4 MB ☐ D 256 KB
- If $SP = 37CDH$, the offset address of the first location in the stack to push data into is
☐ A 37CC H ☐ B 37CD H ☐ C 37CE H ☐ D 37CB H
- The computing machine which can be considered the first general-purpose computer is
☐ A Colossus ☐ B Z3 ☐ C ENIAC ☐ D Abacus
- can be considered a suitable combination of segment:offset registers.
☐ A CS:IP ☐ B DS:SP ☐ C SS:SI ☐ D ES:BP
- Consider $CF = 1$ and $AL = 10100011B$. After the execution of $RCL\ AL, 2$
☐ A $CF = 1$ and $AL = 01000111B$ ☐ B $CF = 0$ and $AL = 10001111B$
☐ C $CF = 0$ and $AL = 10001110B$ ☐ D $CF = 1$ and $AL = 11101000B$
- The data addressing mode in $MOV\ AX, [SI+8]$ is
☐ A register indirect ☐ B base plus index
☐ C register relative ☐ D base relative plus index