

Basic Physics (~70 MCQ)

1. Coulomb's law defines the force between:

- a) Two moving charges
- b) Two point charges at rest ☒
- c) A charge and a magnetic field
- d) A current -carrying wire and a charge

2. The SI unit of electric flux is:

- a) Volt
- b) Coulomb
- c) $\text{Newton} \cdot \text{meter}^2 / \text{Coulomb}$ ☒
- d) Tesla

3. Gauss's law is applicable to:

- a) Only point charges
- b) Any closed surface ☒
- c) Open surfaces
- d) Conductors only

4. Electric potential at a point is:

- a) Energy per unit charge ☒
- b) Force per unit charge
- c) Charge per unit energy
- d) None of these

5. Faraday's law relates:

- a) Electric field and charge
- b) Induced EMF and rate of change of magnetic flux ☒
- c) Current and resistance
- d) Voltage and capacitance

6. Maxwell's equations describe:

- a) Motion of electrons
- b) Electromagnetic fields ☒
- c) Quantum particles
- d) Wave propagation in air only

7. The speed of light in vacuum is:

- a) $3 \times 10^3 \text{ m/s}$
- b) $3 \times 10^5 \text{ m/s}$
- c) $3 \times 10^8 \text{ m/s}$ ☒
- d) $3 \times 10^{10} \text{ m/s}$

8. Photoelectric effect demonstrates that light:

- a) Travels in waves
- b) Has particle nature ☒
- c) Is longitudinal
- d) Has no energy

9. Compton effect proves:

- a) Wave nature of light
- b) Particle nature of light ✓
- c) Magnetic field effect
- d) Electric field effect

10. De Broglie wavelength is associated with:

- a) Photons
- b) Electrons and matter particles ✓
- c) Only protons
- d) Only neutrons

11. Phase velocity is:

- a) Velocity of energy transfer
- b) Velocity of wave crests ✓
- c) Same as group velocity
- d) None of these

12. Group velocity is:

- a) Speed of individual wave
- b) Speed of envelope of wave packet ✓
- c) Always greater than phase velocity
- d) Zero

13. Quantum theory of light was proposed by:

- a) Newton
- b) Einstein ✓
- c) Maxwell
- d) Planck

14. X-ray diffraction is used to study:

- a) Atomic structure ✓
- b) Magnetic field
- c) Electric circuits
- d) Sound waves

15. Wave function in quantum mechanics represents:

- a) Probability amplitude ✓
- b) Energy only
- c) Force
- d) Velocity

16. The integral of electric field over a closed surface equals:

- a) Zero
- b) Charge enclosed/ ϵ_0 ✓
- c) Current enclosed
- d) Voltage

17. Magnetic field is produced by:

- a) Static charges
- b) Moving charges ✓

c) Stationary neutral objects

d) Heat only

18. Faraday's law is a consequence of:

a) Conservation of energy ☒

b) Ohm's law

c) Coulomb's law

d) Kirchhoff's law

19. Unit of magnetic flux is:

a) Tesla

b) Weber ☒

c) Ampere

d) Henry

20. Lorentz force acts on:

a) Stationary charge

b) Moving charge in magnetic field ☒

c) Neutral particles

d) Light only

21. Capacitance is defined as:

a) Q/V ☒

b) V/Q

c) I/R

d) P/V

22. Energy stored in a capacitor:

a) $\frac{1}{2} CV^2$ ☒

b) CV^2

c) $2CV^2$

d) C/V^2

23. Inductor opposes:

a) Voltage

b) Current change ☒

c) Resistance

d) Power

24. RLC circuit resonates when:

a) $X_L = X_C$ ☒

b) $X_L > X_C$

c) $X_L < X_C$

d) $R = 0$

25. Electric field inside a conductor is:

a) Maximum

b) Zero ☒

c) Depends on charge

d) Constant

26. Magnetic flux density is measured in:

- a) Tesla ☒
- b) Weber
- c) Henry
- d) Ampere

27. Ampere's law relates:

- a) Current and magnetic field ☒
- b) Voltage and resistance
- c) Capacitance and charge
- d) Energy and power

28. Biot-Savart law gives:

- a) Force on a charge
- b) Magnetic field due to current element ☒
- c) Electric field
- d) Voltage

29. Self-inductance unit is:

- a) Henry ☒
- b) Farad
- c) Ohm
- d) Tesla

30. Mutual inductance occurs between:

- a) Two resistors
- b) Two coils ☒
- c) Capacitor and coil
- d) Wire and battery

31. Maxwell added which term to Ampere's law?

- a) Displacement current ☒
- b) Conduction current
- c) Electric flux
- d) Magnetic flux

32. Electromagnetic waves are:

- a) Longitudinal
- b) Transverse ☒
- c) Stationary
- d) Random

33. Energy of a photon:

- a) hf ☒
- b) h/f
- c) $h + f$
- d) hf^2

34. Threshold frequency in photoelectric effect depends on:

- a) Intensity

b) Metal type ☒

c) Distance from source

d) Angle of incidence

35. Quantum number n indicates:

a) Angular momentum

b) Principal energy level ☒

c) Magnetic orientation

d) Spin

36. Planck constant h has units:

a) Joule·second ☒

b) Volt

c) Coulomb

d) Ampere·second

37. Compton wavelength formula is:

a) $\lambda_c = h/mc$ ☒

b) $\lambda_c = mc/h$

c) $\lambda_c = h^2/m$

d) $\lambda_c = h/m$

38. X-ray wavelength is in the range:

a) 0.01 – 10 nm ☒

b) 1–100 μm

c) 100 – 1000 nm

d) 10 – 100 cm

39. Electromagnetic spectrum order (low to high frequency):

a) Radio, Microwave, IR, Visible, UV, X-ray, Gamma ☒

b) X-ray, UV, Visible, IR, Microwave, Radio

c) Gamma, X-ray, UV, Visible, IR, Microwave, Radio

d) Radio, IR, Microwave, Visible, UV, X-ray, Gamma

40. Photoelectric current depends on:

a) Light frequency

b) Light intensity ☒

c) Metal temperature

d) None

41. Heisenberg uncertainty principle relates:

a) Energy and time ☒

b) Position and momentum ☒

c) Force and mass

d) Both a & b ☒

42. Wave equation describes:

a) Electric field only

b) Magnetic field only

c) Propagation of waves ☒

d) Particle motion

43. EM wave in vacuum travels at:

a) 3×10^8 m/s ✓

b) 3×10^5 m/s

c) 3×10^3 m/s

d) 3×10^{10} m/s

44. Polarization of light involves:

a) Frequency change

b) Direction change of E vector ✓

c) Amplitude only

d) Wavelength only

45. Brewster's angle gives:

a) Total reflection

b) Zero reflection for one polarization ✓

c) Maximum reflection

d) None

46. Critical angle is related to:

a) Refraction ✓

b) Diffraction

c) Polarization

d) Interference

47. Phase difference of 180° gives:

a) Constructive interference

b) Destructive interference ✓

c) No interference

d) Random waves

48. Energy of X-ray photon is:

a) $E = hf$ ✓

b) $E = h/f$

c) $E = hf^2$

d) $E = f/h$

49. Quantum tunneling explains:

a) Classical reflection

b) Particle crossing potential barrier ✓

c) Wave interference

d) Magnetic effect

50. Electron diffraction proves:

a) Particle nature

b) Wave nature ✓

c) EM wave

d) Photoelectric effect

51. Wavefunction normalization ensures:

- a) Energy conservation
- b) Total probability = 1 ☒
- c) Momentum conservation
- d) Mass conservation

52. Schrödinger equation is:

- a) Time -independent ☒
- b) Time -dependent ☒
- c) Both
- d) None

53. Potential energy in quantum well is:

- a) Infinite
- b) Zero
- c) Finite ☒
- d) Negative

54. Electron in hydrogen atom has:

- a) Continuous energy
- b) Quantized energy ☒
- c) Zero energy
- d) Infinite energy

55. First Boh r orbit radius:

- a) 0.529 Å
- b) 0.529 nm ☒
- c) 5.29 nm
- d) 5.29 cm

56. Photon momentum is:

- a) $p = mv$
- b) $p = hf/c$ ☒
- c) $p = h/f$
- d) $p = mc$

57. Heisenberg principle formula:

- a) $\Delta x \Delta p \geq \hbar/2$ ☒
- b) $\Delta x \Delta p \leq \hbar/2$
- c) $\Delta E \Delta t \leq \hbar$
- d) $\Delta E \Delta t \geq \hbar$

58. Group velocity < Phase velocity in:

- a) Normal dispersion
- b) Anomalous dispersion ☒
- c) Vacuum
- d) Free space

59. Standing wave forms due to:

- a) Single wave
- b) Superposition ☒

c) Refraction

d) Diffraction

60. Node is point of:

a) Maximum amplitude

b) Zero amplitude ☒

c) Half amplitude

d) Random amplitude

61. Antinode is point of:

a) Maximum amplitude ☒

b) Zero amplitude

c) Half amplitude

d) Random amplitude

62. EM wave energy density:

a) $u = \epsilon_0 E^2 / 2$ ☒

b) $u = \mu_0 H^2$

c) $u = EH$

d) $u = 0$

63. Maxwell predicts:

a) EM waves travel at speed of light ☒

b) EM waves are longitudinal

c) EM waves have mass

d) EM waves stationary

64. Quantum of light is:

a) Electron

b) Photon ☒

c) Neutron

d) Proton

65. Wavelength of electron decreases with:

a) Increasing momentum ☒

b) Decreasing momentum

c) Constant

d) None

66. Principle of superposition applies to:

a) Linear systems ☒

b) Nonlinear systems

c) Magnetic fields only

d) Electric fields only

67. Electric field inside a hollow conductor:

a) Zero ☒

b) Non-zero

c) Depends on shape

d) Depends on charge

68. Magnetic permeability of free space:

- a) $4\pi \times 10^{-7}$ H/m ☒
- b) 8.85×10^{-12} F/m
- c) 1 H/m
- d) 0

69. Magnetic flux $\Phi = B \cdot A \cos\theta$, θ is:

- a) Angle between B and area normal ☒
- b) Angle between B and surface
- c) Always 0
- d) Always 90°

70. RLC series circuit resonant frequency:

- a) $f = 1/(2\pi\sqrt{LC})$ ☒
- b) $f = 2\pi\sqrt{LC}$
- c) $f = \sqrt{LC}$
- d) $f = 1/(LC)$

Introduction to Computer Systems (~60 MCQ)

1. The binary number system uses how many digits?

- a) 2 ☒
- b) 8
- c) 10
- d) 16

2. The octal number system uses how many digits?

- a) 2
- b) 8 ☒
- c) 10
- d) 16

3. The hexadecimal number system uses how many digits?

- a) 8
- b) 10
- c) 16 ☒
- d) 2

4. Which of the following is NOT an input device?

- a) Keyboard
- b) Mouse
- c) Printer ☒
- d) Scanner

5. CPU stands for:

- a) Central Processing Unit ☒
- b) Central Peripheral Unit
- c) Control Processing Unit
- d) Computer Processing Unit

6. The main function of the CPU is:

- a) Storage of data
- b) Processing of data ☒
- c) Communication
- d) Display

7. RAM is:

- a) Volatile memory ☒
- b) Non -volatile memory
- c) Secondary storage
- d) Input device

8. ROM is:

- a) Volatile memory
- b) Non -volatile memory ☒
- c) Cache memory
- d) Input device

9. Which of the following is secondary storage?

- a) RAM
- b) Hard Disk ☒
- c) Cache
- d) Register

10. Which of the following is an example of application software?

- a) Windows OS
- b) Microsoft Word ☒
- c) BIOS
- d) Device driver

11. Operating system manages:

- a) Hardware resources ☒
- b) Only software
- c) Only memory
- d) Only CPU

12. Assembly language uses:

- a) Binary code
- b) Mnemonics ☒
- c) High -level commands
- d) Natural language

13. Early computers used which number system?

- a) Binary
- b) Decimal ☒
- c) Octal
- d) Hexadecimal

14. First generation computers used:

- a) Vacuum tubes ☒
- b) Transistors

c) ICs

d) Microprocessors

15. Second generation computers used:

a) Vacuum tubes

b) Transistors ☒

c) ICs

d) Microprocessors

16. Third generation computers used:

a) Vacuum tubes

b) Transistors

c) ICs ☒

d) Microprocessors

17. Fourth generation computers used:

a) Vacuum tubes

b) Transistors

c) ICs

d) Microprocessors ☒

18. Which is NOT a main component of a computer?

a) CPU

b) Memory

c) Printer ☒

d) I/O devices

19. The ALU performs:

a) Arithmetic and logical operations ☒

b) Only arithmetic

c) Only logic

d) Data storage

20. The CU (Control Unit) manages:

a) Arithmetic operations

b) Instruction execution ☒

c) Data storage

d) Input/output

21. BIOS is stored in:

a) RAM

b) ROM ☒

c) Cache

d) Register

22. Number of bits in a byte:

a) 4

b) 8 ☒

c) 16

d) 32

23. 1 KB = ?

- a) 1024 Bytes ☒
- b) 1000 Bytes
- c) 512 Bytes
- d) 2048 Bytes

24. Internet is an example of:

- a) LAN
- b) MAN
- c) WAN ☒
- d) PAN

25. Which is a type of software?

- a) Operating system ☒
- b) Compiler ☒
- c) Word processor ☒
- d) All of the above ☒

26. Binary addition: $101 + 110 = ?$

- a) 1001 ☒
- b) 111
- c) 1010
- d) 1100

27. Decimal 15 in binary is:

- a) 1010
- b) 1111 ☒
- c) 1101
- d) 1001

28. Decimal 255 in hexadecimal is:

- a) 0xFF ☒
- b) 0xAA
- c) 0xF0
- d) 0xFE

29. The fastest memory in computer is:

- a) RAM
- b) Cache ☒
- c) ROM
- d) Hard Disk

30. Number of general-purpose registers in 8086:

- a) 4
- b) 8 ☒
- c) 16
- d) 2

31. What is the base of the hexadecimal system?

- a) 2

- b) 8
- c) 10
- d) 16 ✓

32. A nibble consists of:

- a) 2 bits
- b) 4 bits ✓
- c) 8 bits
- d) 16 bits

33. CPU clock speed is measured in:

- a) Hertz ✓
- b) Volt
- c) Ampere
- d) Joule

34. Program that translates high-level language to machine code:

- a) Compiler ✓
- b) Assembler
- c) Interpreter
- d) Loader

35. Which memory is used to store BIOS?

- a) ROM ✓
- b) RAM
- c) Cache
- d) Register

36. The main memory is:

- a) RAM ✓
- b) ROM
- c) Hard Disk
- d) Cache

37. Cache memory is located:

- a) Between CPU and main memory ✓
- b) On hard disk
- c) In I/O device
- d) In printer

38. The smallest unit of data in a computer:

- a) Byte
- b) Bit ✓
- c) Nibble
- d) Word

39. ASCII is used for:

- a) Images
- b) Text ✓
- c) Audio

d) Video

40. Unicode supports:

a) English only

b) Multiple languages ☒

c) Binary

d) Hexadecimal

41. Operating system is:

a) System software ☒

b) Application software

c) Firmware

d) Hardware

42. Instruction cycle consists of:

a) Fetch ☒

b) Decode ☒

c) Execute ☒

d) All of the above ☒

43. Which of the following is NOT a high-level language?

a) C

b) Python

c) Assembly ☒

d) Java

44. HDD stores data in:

a) RAM

b) Magnetic disks ☒

c) SSD

d) Cache

45. SSD is faster than HDD because:

a) Uses flash memory ☒

b) Uses magnetic disks

c) Less durable

d) Has moving parts

46. Input devices convert :

a) Digital → Analog

b) Human data → Digital ☒

c) Digital → Human readable

d) None

47. Output devices convert:

a) Digital → Analog

b) Digital → Human readable ☒

c) Analog → Digital

d) None

48. Primary memory is:

a) Volatile ☒

b) Non -volatile

c) Permanent

d) Secon dary

49. Secondary memory is:

a) Volatile

b) Non -volatile ☒

c) Faster than RAM

d) Registers

50. Software that helps run other programs:

a) Operating system ☒

b) Application

c) Utility

d) Driver

51. Early computer "ENIAC" used:

a) Transistors

b) Vacuum tubes ☒

c) ICs

d) Microprocessors

52. Which is NOT a characteristic of computer?

a) Speed

b) Accuracy

c) Emotions ☒

d) Storage

53. Binary subtraction: $1010 - 0110 = ?$

a) 0100 ☒

b) 1001

c) 0011

d) 1110

54. ASCII stands for:

a) American Standard Code for Information Interchange ☒

b) Au tomatic System Code for Input

c) Analog Standard Code for Information

d) All of the above

55. Word length in 8086 microprocessor:

a) 8-bit

b) 16 -bit ☒

c) 32 -bit

d) 64 -bit

56. Early computers were used mainly for:

a) Gaming

b) Calculations ☒

c) Internet browsing

d) Social media

57. Input to CPU is through:

a) Registers ☒

b) ALU

c) CU

d) Memory

58. Output from CPU is via:

a) Registers

b) Memory

c) I/O devices ☒

d) ALU

59. Instruction set architecture defines:

a) Hardware

b) Software

c) CPU instructions ☒

d) Memory only

60. Which device connects a computer to the internet?

a) Router ☒

b) Printer

c) Keyboard

d) Monitor

Electrical Circuits (~60 MCQ)

1. Ohm's law states:

a) $V = IR$ ☒

b) $P = IV^2$

c) $I = V/P$

d) $V = I^2R$

2. In a series circuit, the current is:

a) Same in all elements ☒

b) Different in each element

c) Zero

d) Depends on voltage only

3. In a parallel circuit, the voltage across each branch is:

a) Same ☒

b) Different

c) Zero

d) Depends on resistance

4. Kirchhoff's Current Law (KCL) is based on:

a) Energy conservation

b) Charge conservation ☒

c) Ohm's law

d) Faraday's law

5. Kirchhoff's Voltage Law (KVL) is based on:

a) Energy conservation ✓

b) Charge conservation

c) Power conservation

d) Resistance law

6. Power in a resistive circuit:

a) $P = VI$ ✓

b) $P = V^2/R$ ✓

c) $P = I^2R$ ✓

d) All of the above ✓

7. Voltage divider formula:

a) $V_x = V(R_x/R_{total})$ ✓

b) $V_x = IR$

c) $V_x = V/R$

d) $V_x = IR^2$

8. Current divider formula applies to:

a) Series circuit

b) Parallel circuit ✓

c) Both

d) None

9. Thevenin's theorem simplifies a circuit to:

a) Voltage source and series resistor ✓

b) Current source and series resistor

c) Voltage source and parallel resistor

d) Current source and parallel resistor

10. Norton's theorem simplifies a circuit to:

a) Current source and parallel resistor ✓

b) Voltage source and series resistor

c) Current source and series resistor

d) Voltage source and parallel resistor

11. Maximum power transfer occurs when:

a) Load $R =$ Source R ✓

b) Load $R >$ Source R

c) Load $R <$ Source R

d) Load $R = 0$

12. Superposition theorem is applicable for:

a) Linear circuits ✓

b) Non-linear circuits

c) Series circuits only

d) Parallel circuits only

13. Resistance unit is:

a) Ohm ☒

b) Volt

c) Ampere

d) Watt

14. Voltage unit is:

a) Ohm

b) Volt ☒

c) Ampere

d) Watt

15. Current unit is:

a) Ohm

b) Volt

c) Ampere ☒

d) Watt

16. Capacitance unit is:

a) Farad ☒

b) Henry

c) Ohm

d) Tesla

17. Inductance unit is:

a) Henry ☒

b) Farad

c) Ohm

d) Tesla

18. Capacitors in series:

a) $1/C_{eq} = \Sigma(1/C_i)$ ☒

b) $C_{eq} = \Sigma C_i$

c) $C_{eq} = \Sigma C^2$

d) $C_{eq} = 1/\Sigma C$

19. Capacitors in parallel:

a) $C_{eq} = \Sigma C_i$ ☒

b) $1/C_{eq} = \Sigma(1/C_i)$

c) $C_{eq} = \sqrt{\Sigma C_i}$

d) $C_{eq} = \text{None}$

20. Inductors in series:

a) $L_{eq} = \Sigma L_i$ ☒

b) $1/L_{eq} = \Sigma(1/L_i)$

c) $L_{eq} = \sqrt{\Sigma L_i}$

d) None

21. Inductors in parallel:

a) $L_{eq} = \Sigma L_i$

b) $1/L_{eq} = \Sigma(1/L_i)$ ☒

c) $L_{eq} = \sqrt{\Sigma L_i}$

d) None

22. RLC series circuit resonance condition:

a) $X_L = X_C$ ✓

b) $X_L > X_C$

c) $X_L < X_C$

d) $R = 0$

23. Reactance of inductor:

a) $X_L = 2\pi fL$ ✓

b) $X_L = 1/2\pi fL$

c) $X_L = L/f$

d) $X_L = 1/L$

24. Reactance of capacitor:

a) $X_C = 1/2\pi fC$ ✓

b) $X_C = 2\pi fC$

c) $X_C = 1/C$

d) $X_C = 2C$

25. Impedance of series RLC:

a) $Z = \sqrt{R^2 + (X_L - X_C)^2}$ ✓

b) $Z = R + X_L + X_C$

c) $Z = R/(X_L - X_C)$

d) $Z = R^2 + L^2 + C^2$

26. Power factor = $\cos\theta$, θ is:

a) Phase difference between voltage and current ✓

b) Voltage

c) Current

d) Resistance

27. Energy stored in inductor:

a) $W = \frac{1}{2} LI^2$ ✓

b) $W = \frac{1}{2} CV^2$

c) $W = I^2R$

d) $W = VI$

28. Energy stored in capacitor:

a) $W = \frac{1}{2} CV^2$ ✓

b) $W = \frac{1}{2} LI^2$

c) $W = VI$

d) $W = I^2R$

29. Node voltage method is used for:

a) Parallel analysis ✓

b) Series analysis

c) Superposition

d) None

30. Mesh current method is used for:

- a) Series analysis
- b) Loop analysis ☒
- c) Node analysis
- d) Both

31. Source transformation converts:

- a) Voltage source + series R \rightarrow Current source + parallel R ☒
- b) Current source + parallel R \rightarrow Voltage source + series R ☒
- c) Both a & b ☒
- d) None

32. Dependent source is:

- a) Independent voltage
- b) Controlled by another circuit variable ☒
- c) Uncontrolled
- d) Always current source

33. Capacitor blocks:

- a) DC ☒
- b) AC
- c) Both
- d) None

34. Inductor blocks:

- a) AC ☒
- b) DC
- c) Both
- d) None

35. Time constant of RC circuit:

- a) $\tau = RC$ ☒
- b) $\tau = L/R$
- c) $\tau = R/L$
- d) $\tau = 1/RC$

36. Time constant of RL circuit:

- a) $\tau = RC$
- b) $\tau = L/R$ ☒
- c) $\tau = R/L$
- d) $\tau = 1/L$

37. For AC series RLC, resonance frequency:

- a) $f = 1/2\pi\sqrt{LC}$ ☒
- b) $f = \sqrt{LC}$
- c) $f = 2\pi\sqrt{LC}$
- d) $f = LC$

38. In resonance, current is:

- a) Minimum

b) Maximum ☒

c) Zero

d) Constant

39. Voltage across L or C at resonance:

a) Less than supply

b) Equal to supply

c) Can be greater than supply ☒

d) Zero

40. RMS value of sinusoidal current:

a) I_{max}

b) $I_{max}/\sqrt{2}$ ☒

c) $I_{max}/2$

d) $\sqrt{2} I_{max}$

41. RMS value of sinusoidal voltage:

a) V_{max}

b) $V_{max}/\sqrt{2}$ ☒

c) $V_{max}/2$

d) $\sqrt{2} V_{max}$

42. Average power in AC circuit:

a) $V_{rms} \times I_{rms} \times \cos\theta$ ☒

b) $V_{rms} \times I_{rms} \times \sin\theta$

c) $V_{rms} \times I_{rms}$

d) $I_{rms}^2 \times R$

43. Impedance in series AC circuit:

a) $Z = R + j(X_L - X_C)$ ☒

b) $Z = R + X_L + X_C$

c) $Z = R + 1/(X_L - X_C)$

d) $Z = R^2 + (X_L - X_C)^2$

44. Admittance $Y =$

a) $1/Z$ ☒

b) Z

c) R/Z

d) Z/R

45. Phase angle $\varphi =$

a) $\tan^{-1}((X_L - X_C)/R)$ ☒

b) $\tan^{-1}(R/(X_L - X_C))$

c) $\cos^{-1}((X_L - X_C)/R)$

d) $\sin^{-1}((X_L - X_C)/R)$

46. Wye to Delta conversion is used for:

a) Resistors ☒

b) Capacitors ☒

c) Inductors ☒

d) All ☒

47. Delta to Wye conversion is used for:

a) Resistors ☒

b) Capacitors ☒

c) Inductors ☒

d) All ☒

48. RMS voltage of triangular waveform :

a) $V_m/\sqrt{2}$

b) $V_m/\sqrt{3}$ ☒

c) $V_m/2$

d) V_m

49. In AC circuits, instantaneous power:

a) $p = v i$ ☒

b) $p = i^2 R$

c) $p = v^2/R$

d) $p = V_{avg} \times I_{avg}$

50. Current leads voltage in:

a) Capacitive circuit ☒

b) Inductive circuit

c) Resistive circuit

d) None

51. Current lags voltage in:

a) Capacitive

b) Inductive ☒

c) Resistive

d) None

52. Power dissipated in resistor:

a) $I^2 R$ ☒

b) V^2/R ☒

c) VI ☒

d) All of the above ☒

53. Series LC circuit at resonance:

a) Impedance minimum ☒

b) Impedance maximum

c) Current minimum

d) Voltage minimum

54. Parallel LC circuit at resonance:

a) Impedance minimum

b) Impedance maximum ☒

c) Current maximum

d) Voltage zero

55. Quality factor $Q =$

- a) XL/R ☒
- b) XC/R
- c) R/XL
- d) R/XC

56. Transient response occurs in:

- a) DC circuits with L or C ☒
- b) Pure resistive DC circuits
- c) AC steady -state
- d) None

57. Charging capacitor current:

- a) Maximum at $t=0$ ☒
- b) Zero at $t=0$
- c) Constant
- d) None

58. Discharging capacitor current:

- a) Maximum at $t=0$ ☒
- b) Zero at $t=0$
- c) Constant
- d) None

59. DC steady -state inductor acts as:

- a) Open circuit
- b) Short circuit ☒
- c) Capacitor
- d) Resistor

60. DC steady -state capacitor acts as:

- a) Open circuit ☒
- b) Short circuit
- c) Inductor
- d) Resistor

Digital Logic Design (~70 MCQ)

1. Boolean algebra was introduced by:

- a) Newton
- b) Boole ☒
- c) Einstein
- d) Maxwell

2. The AND gate output is 1 only when:

- a) Both inputs are 0
- b) Both inputs are 1 ☒
- c) One input is 1
- d) Any input is 0

3. The OR gate output is 0 only when:

a) Both inputs are 0 ☒

b) Both inputs are 1

c) One input is 1

d) Any input is 1

4. The NOT gate inverts:

a) $1 \rightarrow 0, 0 \rightarrow 1$ ☒

b) $1 \rightarrow 1, 0 \rightarrow 0$

c) $1 \rightarrow 1, 0 \rightarrow 1$

d) None

5. De Morgan's theorem states:

a) $(A \cdot B)' = A' + B'$ ☒

b) $(A + B)' = A + B$

c) $(A + B)' = A' B'$ ☒

d) Both a & c ☒

6. NAND gate is called:

a) Universal gate ☒

b) Basic gate

c) Logic gate

d) None

7. NOR gate is called:

a) Universal gate ☒

b) Basic gate

c) Logic gate

d) None

8. XOR gate output is 1 when:

a) Inputs same

b) Inputs different ☒

c) Both inputs 0

d) Both inputs 1

9. XNOR gate output is 1 when:

a) Inputs same ☒

b) Inputs different

c) Both 0

d) Both 1

10. Sum-of-Products (SOP) is:

a) OR of AND terms ☒

b) AND of OR terms

c) XOR of AND terms

d) NAND of OR terms

11. Product -of-Sums (POS) is:

a) OR of AND terms

b) AND of OR terms ☒

c) XOR of OR terms

d) NOR of AND terms

12. K-map is used for:

a) Minimization of Boolean expression ✓

b) Maximization

c) Multiplexing

d) Latching

13. 2-to-1 multiplexer has:

a) 2 inputs, 1 select ✓

b) 2 outputs, 1 input

c) 1 input, 2 select

d) 2 outputs, 2 select

14. 4-to-1 multiplexer has:

a) 4 inputs, 2 select ✓

b) 4 outputs, 2 select

c) 2 inputs, 4 select

d) 1 input, 4 select

15. Demultiplexer converts:

a) 1 input → many outputs ✓

b) Many inputs → 1 output

c) OR operation

d) AND operation

16. Decoder converts:

a) n inputs → 2^n outputs ✓

b) 2^n inputs → n outputs

c) n outputs → n inputs

d) None

17. Encoder converts:

a) 2^n inputs → n outputs ✓

b) n inputs → 2^n outputs

c) OR → AND

d) None

18. Half adder produces:

a) Sum only

b) Carry only

c) Sum & Carry ✓

d) Difference & Borrow

19. Full adder has:

a) 2 inputs

b) 3 inputs ✓

c) 4 inputs

d) 1 input

20. Flip-flops store:

- a) Voltage
- b) Bit of information ✓
- c) Current
- d) Logic gate

21. SR flip-flop is built using:

- a) NAND/NOR gates ✓
- b) XOR
- c) XNOR
- d) AND

22. JK flip-flop overcomes:

- a) Race condition in SR ✓
- b) Memory loss
- c) Input error
- d) Timing error

23. D flip-flop output =

- a) Input D ✓
- b) Input Q
- c) Inverted D
- d) Sum

24. T flip-flop toggles on:

- a) $T=1$ ✓
- b) $T=0$
- c) Clock high
- d) Reset

25. Asynchronous counter uses:

- a) Same clock ✓
- b) Ripple effect
- c) Parallel clocking
- d) Both a & b ✓

26. Synchronous counter:

- a) All flip-flops clocked simultaneously ✓
- b) Ripple clocked
- c) Not clocked
- d) None

27. Mealy machine output depends on:

- a) Present state only
- b) Present input only
- c) Present state & input ✓
- d) Previous state

28. Moore machine output depends on:

- a) Present state only ✓

- b) Present input
- c) Previous state
- d) Both state & input

29. PLA stands for:

- a) Programmable Logic Array ✓
- b) Parallel Logic Array
- c) Primary Logic Adder
- d) None

30. PLA used for:

- a) Logic function implementation ✓
- b) Storage
- c) Multiplexing
- d) None

31. Race around problem occurs in:

- a) SR flip-flop
- b) JK flip-flop ✓
- c) D flip-flop
- d) T flip-flop

32. Pulse mode design avoids:

- a) Multiple triggering ✓
- b) Single triggering
- c) Flip-flop operation
- d) Logic minimization

33. Fundamental mode design uses:

- a) Only one input change at a time ✓
- b) Multiple inputs
- c) Asynchronous
- d) None

34. Combinational circuit output depends on:

- a) Present inputs only ✓
- b) Present & past inputs
- c) Clock
- d) State

35. Sequential circuit output depends on:

- a) Present inputs only
- b) Present & past inputs ✓
- c) Clock only
- d) None

36. Boolean expression simplification reduces:

- a) Gate count ✓
- b) Power consumption ✓
- c) Complexity ✓

d) All ☒

37. XOR gate is equivalent to:

a) $A'B + AB'$ ☒

b) $AB + A'B'$

c) $A + B$

d) $A \cdot B$

38. XNOR gate is equivalent to:

a) $AB + A'B'$ ☒

b) $A'B + AB'$

c) $A + B$

d) $A \cdot B$

39. NAND gate expression:

a) $(AB)'$ ☒

b) $A + B$

c) AB

d) $(A + B)'$

40. NOR gate expression:

a) $(A+B)'$ ☒

b) $A + B$

c) AB

d) $(AB)'$

41. Number of minterms for n variables:

a) n

b) 2^n ☒

c) n^2

d) 2n

42. Number of maxterms for n variables:

a) n

b) 2^n ☒

c) n^2

d) 2n

43. Canonical SOP uses:

a) Minterms ☒

b) Maxterms

c) Sum

d) Product

44. Canonical POS uses:

a) Minterms

b) Maxterms ☒

c) Sum

d) Product

45. Logic minimization reduces:

a) Cost ☒

b) Speed

c) Complexity ☒

d) Both a & c ☒

46. Flip-flop stores:

a) 1 bit ☒

b) 2 bits

c) 4 bits

d) Variable

47. Latches are:

a) Level triggered ☒

b) Edge triggered

c) Pulse mode

d) None

48. Flip-flops are:

a) Level triggered

b) Edge triggered ☒

c) Pulse mode

d) None

49. Pulse -triggered flip -flops help avoid:

a) Race around ☒

b) Memory loss

c) Logic error

d) Power consumption

50. Asynchronous counter also called:

a) Ripple counter ☒

b) Ring counter

c) Synchronous counter

d) Johnson counter

51. Synchronous counter is:

a) Ripple type

b) Clocked simultaneously ☒

c) Level triggered

d) None

52. 4-bit asynchronous counter counts:

a) 0-7

b) 0-15 ☒

c) 0-31

d) 0-63

53. 3-bit synchronous counter max count:

a) 7 ☒

b) 3

c) 8

d) 15

54. Edge triggering refers to:

a) Clock rising/falling ☒

b) Clock high

c) Clock low

d) Pulse width

55. JK flip -flop toggles when:

a) $J=K=1$ ☒

b) $J=1, K=0$

c) $J=0, K=1$

d) $J=K=0$

56. Clock frequency determines:

a) Circuit speed ☒

b) Gate number

c) Power

d) Output only

57. Race around occurs when propagation delay < pulse width:

a) True ☒

b) False

c) Sometimes

d) None

58. Edge -triggered flip -flop avoids:

a) Multiple toggles ☒

b) Memory

c) Delay

d) Logic error

59. MUX selects:

a) One input ☒

b) All inputs

c) Output

d) Gate

60. DEMUX distributes:

a) Input to one output ☒

b) Input to all outputs

c) Gate

d) None

61. SOP minimization reduces:

a) AND gates

b) OR gates

c) Both ☒

d) XOR

62. POS minimization reduces:

- a) OR gates
- b) AND gates
- c) Both ☒
- d) NAND

63. Universal gate can implement:

- a) All logic ☒
- b) None
- c) Only OR
- d) Only AND

64. Flip-flop characteristic table lists:

- a) Inputs & outputs ☒
- b) Inputs only
- c) Outputs only
- d) Clock only

65. Level -triggered latch changes state:

- a) Clock high ☒
- b) Clock low
- c) Both
- d) Edge

66. Edge -triggered flip -flop changes state:

- a) Rising/falling ☒
- b) Level high
- c) Level low
- d) None

67. Pulse mode design avoids:

- a) Multiple toggles ☒
- b) Race
- c) Timing errors ☒
- d) All ☒

68. State diagram represents:

- a) Sequential behavior ☒
- b) Combinational logic
- c) Input only
- d) Output only

69. Mealy machine faster than Moore because:

- a) Output depends on input ☒
- b) Output depends on state
- c) Uses fewer flip -flops
- d) None

70. Fundamental mode design ensures:

- a) Only one input changes at a time ☒

- b) Multiple input changes
- c) Synchronous
- d) None

Basic Electronics (~60 MCQ)

1. Diode allows current to flow in:

- a) Both directions
- b) One direction ☒
- c) No direction
- d) Depends on voltage

2. Forward biased diode has:

- a) High resistance
- b) Low resistance ☒
- c) Infinite resistance
- d) Zero resistance

3. Reverse biased diode has:

- a) High resistance ☒
- b) Low resistance
- c) Zero resistance
- d) Low voltage

4. Zener diode is used for:

- a) Amplification
- b) Voltage regulation ☒
- c) Switching
- d) Oscillation

5. Half-wave rectifier uses:

- a) 1 diode ☒
- b) 2 diodes
- c) 4 diodes
- d) None

6. Full-wave rectifier uses:

- a) 1 diode
- b) 2 diodes ☒
- c) 4 diodes
- d) None

7. Bridge rectifier uses:

- a) 2 diodes
- b) 3 diodes
- c) 4 diodes ☒
- d) 1 diode

8. Clipper circuit:

- a) Clips voltage above/below reference ☒
- b) Amplifies signal

- c) Rectifies signal
- d) Filters signal

9. Clamper circuit:

- a) Shifts signal DC level ☒
- b) Clips voltage
- c) Rectifies
- d) Amplifies

10. Bipolar junction transistor (BJT) has:

- a) 2 terminals
- b) 3 terminals ☒
- c) 4 terminals
- d) 5 terminals

11. BJT modes:

- a) Active ☒
- b) Cut -off ☒
- c) Saturation ☒
- d) All ☒

12. Common emitter configuration provides:

- a) Voltage gain ☒
- b) Current gain ☒
- c) Power gain ☒
- d) All ☒

13. Common base configuration has:

- a) Current gain < 1 ☒
- b) Voltage gain high ☒
- c) Input low
- d) Output low

14. Common collector configuration is also called:

- a) Emitter follower ☒
- b) Base follower
- c) Collector follower
- d) None

15. BJT used as switch operates in:

- a) Active region
- b) Cut -off & saturation ☒
- c) Reverse bias
- d) None

16. Load line represents:

- a) Relationship between V & I ☒
- b) Current only
- c) Voltage only

d) None

17. Stability factor determines:

a) BJT bias stability ☒

b) Voltage

c) Current

d) Resistance

18. Small signal model of BJT uses:

a) h-parameters ☒

b) Z-parameters

c) Y-parameters

d) None

19. Voltage gain of CE amplifier:

a) High ☒

b) Low

c) Zero

d) Negative

20. Current gain of CE amplifier:

a) High ☒

b) Low

c) Zero

d) Negative

21. Input impedance of CB amplifier:

a) High

b) Low ☒

c) Medium

d) Variable

22. Output impedance of CE amplifier:

a) Low

b) High ☒

c) Medium

d) Variable

23. Field effect transistor (FET) has:

a) High input impedance ☒

b) Low input impedance

c) Medium

d) Variable

24. JFET gate is:

a) Forward biased

b) Reverse biased ☒

c) Floating

d) None

25. MOSFET can be:

a) Depletion type ☒

b) Enhancement type ☒

c) Both ☒

d) None

26. FET operates on:

a) Voltage control ☒

b) Current control

c) Both

d) None

27. Diode's knee voltage ~

a) 0.7V for silicon ☒

b) 0.3V for silicon

c) 0.7V for germanium

d) 0.3V for germanium

28. Zener voltage is:

a) Breakdown voltage ☒

b) Forward voltage

c) Knee voltage

d) None

29. Half-wave rectifier output frequency =

a) Input frequency

b) Same as input ☒

c) Twice input

d) Half input

30. Full-wave rectifier output frequency =

a) Same as input

b) Twice input ☒

c) Half input

d) None

31. Capacitor filter removes:

a) AC ripples ☒

b) DC

c) Voltage

d) Current

32. Diode reverse recovery time:

a) Time to turn off ☒

b) Time to turn on

c) Forward voltage

d) None

33. Transistor as amplifier operates in:

a) Cut-off

b) Active ☒

c) Saturation

d) Reverse

34. Transistor as switch operates in:

a) Active

b) Cut -off & saturation ☒

c) Reverse

d) None

35. BJT has:

a) Base, emitter, collector ☒

b) Gate, source, drain

c) Emitter, collector

d) None

36. FET has:

a) Base, collector, emitter

b) Gate, source, drain ☒

c) Input, output

d) None

37. MOSFET input impedance:

a) Low

b) Very high ☒

c) Medium

d) Variable

38. Clipper removes:

a) Part of waveform ☒

b) Entire waveform

c) DC

d) AC

39. Clamper shifts:

a) DC level ☒

b) AC level

c) Both

d) None

40. Forward biased diode resistance:

a) High

b) Low ☒

c) Infinite

d) Zero

41. Reverse biased diode leakage current:

a) High

b) Low ☒

c) Zero

d) Medium

42. Power dissipation in transistor:

- a) $V_{CE} \times I_C$ ✓
- b) $V_{BE} \times I_B$
- c) $I_C \times I_B$
- d) None

43. CE amplifier phase shift:

- a) 0°
- b) 180° ✓
- c) 90°
- d) None

44. CB amplifier phase shift:

- a) 0° ✓
- b) 180°
- c) 90°
- d) None

45. CC amplifier phase shift:

- a) 0° ✓
- b) 180°
- c) 90°
- d) None

46. Small signal model helps determine:

- a) Gain ✓
- b) Impedance ✓
- c) Both ✓
- d) None

47. Junction diode symbol:

- a) Triangle → line ✓
- b) Line → triangle
- c) Circle
- d) Square

48. Zener diode symbol:

- a) Line with bent bar ✓
- b) Triangle → line
- c) Circle
- d) Square

49. Half-wave rectifier uses:

- a) Transformer ✓
- b) Diode ✓
- c) Capacitor ✓
- d) All ✓

50. Full-wave rectifier bridge has:

- a) 2 diodes

b) 4 diodes ☒

c) 3 diodes

d) 1 diode

51. Peak inverse voltage (PIV) in diode:

a) Max reverse voltage ☒

b) Forward voltage

c) Average voltage

d) None

52. Transistor cutoff:

a) $I_B=0$ ☒

b) $I_C=0$

c) VCE small

d) Active

53. Transistor saturation:

a) $V_{CE} \approx 0$ ☒

b) $I_C \approx 0$

c) $I_B \approx 0$

d) Active

54. JFET operates:

a) Forward biased ☒

b) Reverse biased

c) Zero bias

d) None

55. MOSFET enhancement mode needs:

a) Gate voltage ☒

b) Gate current

c) Source voltage

d) Drain voltage

56. MOSFET depletion mode:

a) Naturally conducting ☒

b) Needs gate voltage

c) Switch off

d) None

57. Load line intersects:

a) DC and AC curves ☒

b) Input curve

c) Output curve

d) None

58. Diode cut-in voltage:

a) Minimum voltage to conduct ☒

b) Maximum

c) Zero

d) Infinite

59. Voltage multiplier uses:

a) Diodes & capacitors ☒

b) Transistors

c) Resistors

d) Inductors

60. Zener regulator provides:

a) Constant voltage ☒

b) Constant current

c) Constant resistance

d) None

Microprocessor & Interfacing (~60 MCQ)

1. Microprocessor is:

a) A software

b) Central processing unit on a single chip ☒

c) Memory chip

d) Input device

2. Difference between microprocessor and microcontroller:

a) Microprocessor lacks RAM/ROM ☒

b) Microcontroller has built-in RAM/ROM ☒

c) Both a & b ☒

d) None

3. 8086/8088 belongs to:

a) 4-bit family

b) 8-bit family

c) 16-bit family ☒

d) 32-bit family

4. 8086 has:

a) 8-bit data bus

b) 16-bit data bus ☒

c) 32-bit data bus

d) 64-bit data bus

5. Memory segmentation in 8086:

a) Code, data, stack, extra ☒

b) Input, output

c) Registers only

d) None

6. Instruction set of 8086 contains:

a) Data transfer ☒

b) Arithmetic ☒

c) Logical ☒

d) All ☒

7. Addressing mode specifies:

- a) How to access operands ☒
- b) Data size
- c) Clock
- d) Power

8. Immediate addressing uses:

- a) Constant value ☒
- b) Memory address
- c) Register
- d) Input

9. Register addressing uses:

- a) CPU register ☒
- b) Memory
- c) Input
- d) Constant

10. Direct addressing uses:

- a) Memory address ☒
- b) Register
- c) Immediate
- d) Port

11. Indirect addressing uses:

- a) Register contains address ☒
- b) Memory contains address
- c) Immediate
- d) Port

12. Single -processor system has:

- a) One CPU ☒
- b) Multiple CPUs
- c) None
- d) All

13. Multi -processor system:

- a) One CPU
- b) Multiple CPUs ☒
- c) None
- d) All

14. Assembler converts:

- a) Assembly → Machine code ☒
- b) High -level → Assembly
- c) Machine → Assembly
- d) None

15. Debugger is used for:

- a) Detecting errors ☒

- b) Writing code
- c) Compiling
- d) Executing only

16. 8255A is:

- a) Programmable Peripheral Interface ☒
- b) Timer
- c) DMA
- d) Memory

17. 8254 is:

- a) Programmable interval timer ☒
- b) PPI
- c) Interrupt controller
- d) UART

18. Keyboard interfacing can be done via:

- a) 8255 ☒
- b) 8254
- c) 8259
- d) DMA

19. LCD interfacing uses:

- a) 8255 ☒
- b) 8254
- c) 8259
- d) None

20. Printer interfacing uses:

- a) Parallel ☒
- b) Serial
- c) Both ☒
- d) None

21. Stepper motor interfacing:

- a) 8255 ☒
- b) 8259
- c) 8254
- d) None

22. A/D converter converts:

- a) Analog → Digital ☒
- b) Digital → Analog
- c) Voltage
- d) Current

23. D/A converter converts:

- a) Analog → Digital
- b) Digital → Analog ☒
- c) Both

d) None

24. 8259A is:

a) Programmable interrupt controller ☒

b) Timer

c) PPI

d) DMA

25. Interrupt vector table stores:

a) Addresses of interrupt routines ☒

b) Data

c) Instructions

d) None

26. DMA stands for:

a) Direct Memory Access ☒

b) Dynamic Memory Access

c) Dual Memory Access

d) Data Memory Access

27. Serial communication can be:

a) Synchronous ☒

b) Asynchronous ☒

c) Both ☒

d) None

28. EIA RS232 is:

a) Physical communication standard ☒

b) Protocol

c) Memory

d) Timer

29. Microprocessor clock controls:

a) Instruction timing ☒

b) Data

c) Voltage

d) Current

30. Bus demultiplexer separates:

a) Address & data lines ☒

b) Input lines

c) Output lines

d) Power

31. Bus controller manages:

a) Data transfer ☒

b) Instruction fetch

c) Clock

d) None

32. Programmed I/O means:

a) CPU actively polls ☒

b) CPU interrupts

c) DMA

d) None

33. Interrupt driven I/O:

a) CPU waits

b) CPU responds to interrupt ☒

c) CPU ignores

d) None

34. Parallel I/O port transfers:

a) 1 bit

b) Multiple bits simultaneously ☒

c) Serially

d) None

35. SRAM stands for:

a) Static RAM ☒

b) Serial RAM

c) Synchronous RAM

d) None

36. EEPROM stands for:

a) Electrically Erasable Programmable ROM ☒

b) RAM

c) Flash

d) None

37. Clock generator produces:

a) Timing pulses ☒

b) Data

c) Instructions

d) None

38. Stepper motor moves in:

a) Continuous rotation

b) Steps ☒

c) Random

d) None

39. Timer applications include:

a) Delay ☒

b) Event counting ☒

c) Pulse generation ☒

d) All ☒

40. Asynchronous serial communication uses:

a) Start & stop bits ☒

b) Clock

c) Both

d) None

41. Microprocessor I/O address decoding ensures:

a) Correct device access ☒

b) Timing

c) Speed

d) None

42. Interrupt vector points to:

a) Interrupt routine ☒

b) Main program

c) Data

d) Timer

43. Single-step execution helps in:

a) Debugging ☒

b) Speeding

c) Storage

d) Communication

44. Flag registers store:

a) Status ☒

b) Data

c) Address

d) Control

45. Carry flag is set when:

a) Addition exceeds limit ☒

b) Subtraction negative

c) Overflow

d) Zero

46. Zero flag is set when:

a) Result = 0 ☒

b) Result > 0

c) Carry occurs

d) None

47. Sign flag indicates:

a) Positive/negative ☒

b) Zero

c) Carry

d) Overflow

48. Parity flag checks:

a) Even/odd bits ☒

b) Zero

c) Carry

d) Sign

49. Program counter stores:

- a) Next instruction address ☒
- b) Current instruction
- c) Data
- d) Stack pointer

50. Stack pointer points to:

- a) Top of stack ☒
- b) Bottom
- c) Memory
- d) None

51. PUSH instruction:

- a) Store in stack ☒
- b) Retrieve from stack
- c) Clear stack
- d) None

52. POP instruction:

- a) Store
- b) Retrieve ☒
- c) Clear
- d) None

53. Software interrupt generated by:

- a) Instruction ☒
- b) External device
- c) Timer
- d) DMA

54. Hardware interrupt generated by:

- a) Device ☒
- b) Instruction
- c) Program
- d) Memory

55. Instruction cycle includes:

- a) Fetch ☒
- b) Decode ☒
- c) Execute ☒
- d) All ☒

56. Data bus width determines:

- a) Data size per transfer ☒
- b) Address
- c) Instruction
- d) Clock

57. Address bus width determines:

- a) Maximum memory accessible ☒

- b) Data size
- c) Instruction size
- d) Clock

58. Control signals include:

- a) RD, WR ☒
- b) ALE ☒
- c) INTA ☒
- d) All ☒

59. Microprocessor interfacing requires:

- a) Address decoding ☒
- b) Timing
- c) Data bus
- d) All ☒

60. Multi -processor system advantage:

- a) High speed ☒
- b) Parallel processing ☒
- c) Reliability ☒
- d) All ☒

Communication Theory (~50 MCQ)

1. Fourier series represents:

- a) Continuous signals ☒
- b) Discrete signals
- c) Both
- d) None

2. Fourier transform converts:

- a) Time \rightarrow Frequency ☒
- b) Frequency \rightarrow Time
- c) Voltage \rightarrow Current
- d) None

3. Convolution in time domain equals:

- a) Multiplication in frequency domain ☒
- b) Addition
- c) Subtraction
- d) Division

4. Parseval's theorem relates:

- a) Energy in time & frequency ☒
- b) Power
- c) Voltage
- d) Current

5. Entropy in information theory measures:

- a) Uncertainty ☒

- b) Speed
- c) Bandwidth
- d) Amplitude

6. Shannon's theorem gives:

- a) Maximum channel capacity ✓
- b) Minimum noise
- c) Maximum power
- d) None

7. Channel capacity depends on:

- a) Bandwidth ✓
- b) Signal -to-noise ratio ✓
- c) Both ✓
- d) None

8. Analog modulation includes:

- a) AM ✓
- b) FM ✓
- c) PM ✓
- d) All ✓

9. AM stands for:

- a) Amplitude Modulation ✓
- b) Angular Modulation
- c) Analog Modulation
- d) None

10. FM stands for:

- a) Frequency Modulation ✓
- b) Phase Modulation
- c) Amplitude Modulation
- d) None

11. PM stands for:

- a) Phase Modulation ✓
- b) Frequency Modulation
- c) Amplitude Modulation
- d) None

12. Modulation purpose:

- a) Efficient transmission ✓
- b) Amplification
- c) Rectification
- d) None

13. Demodulation recovers:

- a) Original signal ✓
- b) Noise
- c) Carrier

d) None

14. Pulse Amplitude Modulation (PAM) uses:

a) Amplitude of pulses ☒

b) Frequency

c) Phase

d) None

15. Pulse Code Modulation (PCM) is:

a) Digital modulation ☒

b) Analog modulation

c) Hybrid

d) None

16. Delta modulation (DM) encodes:

a) Difference between samples ☒

b) Absolute value

c) Average

d) None

17. Adaptive delta modulation (ADM) adjusts:

a) Step size ☒

b) Frequency

c) Phase

d) None

18. Time -Division Multiplexing (TDM) divides:

a) Time slots ☒

b) Frequency

c) Phase

d) None

19. Frequency -Division Multiplexing (FDM) divides:

a) Frequency ☒

b) Time

c) Phase

d) None

20. TDMA is:

a) Time -division multiple access ☒

b) Frequency -division

c) Code -division

d) None

21. FDMA is:

a) Time -division

b) Frequency -division multiple access ☒

c) Code -division

d) None

22. CDMA uses:

a) Codes to separate users ✓

b) Time slots

c) Frequency bands

d) None

23. Nyquist sampling theorem states:

a) $F_s \geq 2 \times f_{\max}$ ✓

b) $F_s < f_{\max}$

c) $F_s = f_{\max}$

d) None

24. Aliasing occurs if:

a) $F_s < 2 \times f_{\max}$ ✓

b) $F_s \geq 2 \times f_{\max}$

c) $F_s = 2 \times f_{\max}$

d) None

25. SNR stands for:

a) Signal -to-Noise Ratio ✓

b) Signal -to-Number

c) Sound -to-Noise

d) None

26. Power spectrum represents:

a) Distribution of power over frequency ✓

b) Time

c) Amplitude

d) None

27. Baseband signal is:

a) Original signal ✓

b) Modulated signal

c) Carrier

d) None

28. Bandpass signal is:

a) Centered around carrier ✓

b) Original signal

c) Noise

d) None

29. AM modulated signal has:

a) Carrier + sidebands ✓

b) Carrier only

c) Sidebands only

d) None

30. FM bandwidth depends on:

a) Frequency deviation ✓

b) Amplitude

c) Phase

d) None

31. PM bandwidth depends on:

a) Phase deviation ☒

b) Frequency

c) Amplitude

d) None

32. Coherent detection used for:

a) AM demodulation ☒

b) FM

c) PM

d) None

33. Envelope detection used for:

a) AM ☒

b) FM

c) PM

d) None

34. Multiplexing purpose:

a) Efficient utilization ☒

b) Amplification

c) Modulation

d) None

35. Information rate formula:

a) $R = H \times \text{symbols/sec}$ ☒

b) $R = H \times f$

c) $R = P \times t$

d) None

36. Signal bandwidth affects:

a) Data rate ☒

b) Power

c) Voltage

d) None

37. Noise degrades:

a) SNR ☒

b) Bandwidth

c) Time

d) None

38. Shannon capacity formula:

a) $C = B \log_2(1 + S/N)$ ☒

b) $C = B \times S/N$

c) $C = B / S/N$

d) None

39. Analog vs digital communication:

- a) Analog continuous ☒
- b) Digital discrete ☒
- c) Both correct ☒
- d) None

40. Multiplexing reduces:

- a) Number of channels ☒
- b) Bandwidth
- c) Noise
- d) None

41. Demultiplexer separates:

- a) Combined signals ☒
- b) Carrier
- c) Modulation
- d) None

42. Fourier series uses:

- a) Sin & cos ☒
- b) Exponential only
- c) Step function
- d) None

43. Power spectrum integral =

- a) Signal energy ☒
- b) Noise
- c) Bandwidth
- d) None

44. Pulse duration affects:

- a) Bandwidth ☒
- b) Power
- c) Noise
- d) None

45. PCM uses:

- a) Sampling ☒
- b) Quantization ☒
- c) Encoding ☒
- d) All ☒

46. Delta modulation advantage:

- a) Simple ☒
- b) Requires low bandwidth ☒
- c) Adaptive possible ☒
- d) All ☒

47. CDMA allows:

- a) Multiple users ☒
- b) Single user
- c) Only one channel
- d) None

48. Nyquist rate =

- a) $2 \times f_{\max}$ ☒
- b) f_{\max}
- c) $f_{\max} / 2$
- d) None

49. Pulse shaping reduces:

- a) Inter-symbol interference ☒
- b) Noise
- c) Bandwidth
- d) None

50. Communication system goal:

- a) Reliable data transfer ☒
- b) Maximum noise
- c) Minimum bandwidth
- d) None

Computer Networking & Security (~60 MCQ)

1. Protocol hierarchy defines:

- a) Layered communication ☒
- b) Hardware only
- c) Software only
- d) None

2. Data link layer provides:

- a) Reliable link ☒
- b) Routing
- c) Application
- d) Transport

3. HDLC stands for:

- a) High-Level Data Link Control ☒
- b) High-Level Device Control
- c) Hardware Link Device Control
- d) None

4. LAN protocols include:

- a) IEEE 802.3 ☒
- b) IEEE 802.11 ☒
- c) Both ☒
- d) None

5. Hub operates at:

- a) Physical layer ☒

- b) Data link
- c) Network
- d) Transport

6. Switch operates at:

- a) Physical
- b) Data link ☒
- c) Network
- d) Transport

7. Bridge connects:

- a) Two LANs ☒
- b) Two computers
- c) Router
- d) None

8. FDDI uses:

- a) Fiber optic ☒
- b) Copper
- c) Wireless
- d) None

9. Fast Ethernet speed:

- a) 10 Mbps
- b) 100 Mbps ☒
- c) 1 Gbps
- d) 10 Gbps

10. Routing algorithm decides:

- a) Path selection ☒
- b) Bandwidth
- c) Speed
- d) None

11. Congestion control prevents:

- a) Network overload ☒
- b) Data loss
- c) Security
- d) None

12. Internetworking involves:

- a) Connecting LANs/WANs ☒
- b) Hardware only
- c) Software only
- d) None

13. Fragmentation occurs when:

- a) Packet > MTU ☒
- b) Packet < MTU
- c) Router fails

d) None

14. Firewall purpose:

a) Network security ☒

b) Routing

c) Switching

d) None

15. IPV4 address length:

a) 32 bits ☒

b) 64 bits

c) 128 bits

d) 16 bits

16. IPV6 address length:

a) 32 bits

b) 64 bits

c) 128 bits ☒

d) 16 bits

17. ARP resolves:

a) IP → MAC ☒

b) MAC → IP

c) Port → IP

d) None

18. RARP resolves:

a) MAC → IP ☒

b) IP → MAC

c) Port → IP

d) None

19. Mobile IP enables:

a) Device mobility ☒

b) Routing

c) Switching

d) None

20. Transport protocol for reliable communication:

a) TCP ☒

b) UDP

c) ICMP

d) None

21. TCP provides:

a) Connection -oriented ☒

b) Error checking ☒

c) Flow control ☒

d) All ☒

22. UDP provides:

a) Connectionless ☒

b) No guarantee ☒

c) Both ☒

d) None

23. AAL of ATM:

a) Adaptation layer ☒

b) Application layer

c) Transport layer

d) None

24. Network security includes:

a) Cryptography ☒

b) Authentication ☒

c) Digital signatures ☒

d) All ☒

25. DES stands for:

a) Data Encryption Standard ☒

b) Digital Encryption Standard

c) Data Encoding System

d) None

26. IDEA stands for:

a) International Data Encryption Algorithm ☒

b) Data Encryption Algorithm

c) Information Encoding

d) None

27. Public key algorithm uses:

a) Two keys ☒

b) One key

c) Both

d) None

28. Authentication ensures:

a) Identity verification ☒

b) Data transfer

c) Speed

d) None

29. Digital signature ensures:

a) Authentication ☒

b) Integrity ☒

c) Both ☒

d) None

30. Gigabit Ethernet speed:

a) 100 Mbps

b) 1 Gbps ☒

c) 10 Gbps

d) None

31. DNS resolves:

a) Domain → IP ☒

b) IP → Domain

c) MAC → IP

d) None

32. Name servers store:

a) Domain name info ☒

b) IP only

c) MAC only

d) None

33. Email privacy is ensured by:

a) Encryption ☒

b) Routing

c) Firewall

d) None

34. SNMP stands for:

a) Simple Network Management Protocol ☒

b) Secure Network

c) Standard Network

d) None

35. HTTP operates at:

a) Application layer ☒

b) Transport

c) Network

d) Data link

36. HTTPS ensures:

a) Secure HTTP ☒

b) Fast HTTP

c) Normal HTTP

d) None

37. LAN uses:

a) Ethernet ☒

b) FDDI ☒

c) Both ☒

d) None

38. WAN connects:

a) Large area networks ☒

b) Single computer

c) Router only

d) None

39. Fragmentation handled by:

a) Network layer ☒

b) Transport

c) Data link

d) None

40. IPV4 provides:

a) 4 billion addresses ☒

b) 1 billion

c) 128 bit

d) None

41. IPV6 provides:

a) 128 -bit address ☒

b) 32 -bit

c) 64 -bit

d) None

42. TCP uses:

a) Three -way handshake ☒

b) UDP

c) ICMP

d) None

43. UDP uses:

a) No handshake ☒

b) Handshake

c) Connection -oriented

d) None

44. Firewalls can be:

a) Packet filtering ☒

b) Proxy ☒

c) Both ☒

d) None

45. Cryptography converts:

a) Plaintext → Ciphertext ☒

b) Ciphertext → Plaintext

c) Data only

d) None

46. VPN ensures:

a) Secure private network ☒

b) Open network

c) LAN only

d) None

47. Transport layer manages:

a) End -to-end communication ☒

b) Node -to-node

c) Data link

d) Physical

48. ARP used in:

a) Local network ☒

b) Internet

c) WAN

d) None

49. RARP used to:

a) Assign IP from MAC ☒

b) Assign MAC

c) DNS

d) None

50. ICMP used for:

a) Error reporting ☒

b) Data transfer

c) Encryption

d) None

51. SMTP used for:

a) Sending emails ☒

b) Receiving emails

c) Browsing

d) None

52. POP3 used for:

a) Receiving emails ☒

b) Sending emails

c) Browsing

d) None

53. IMAP used for:

a) Receiving emails ☒

b) Sending

c) Browsing

d) None

54. VPN tunnel provides:

a) Encrypted path ☒

b) Open path

c) Wireless path

d) None

55. Network congestion occurs due to:

a) Excessive traffic ☒

b) Low traffic

c) Short cable

d) None

56. Routing algorithms include:

a) Distance vector ☒

b) Link state ☒

c) Both ☒

d) None

57. MAC address is:

a) Hardware address ☒

b) IP address

c) Domain name

d) None

58. IPv4 address written in:

a) Dot -decimal ☒

b) Hex

c) Binary only

d) None

59. IPv6 address written in:

a) Hexadecimal ☒

b) Decimal

c) Binary

d) None

60. Network layer provides:

a) Logical addressing ☒

b) Physical addressing

c) Transport

d) Application