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) Newton·meter²/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) 3×10^{3} m/s
   b) 3×10^{5} m/s
   c) 3×10^{8} m/s ✅
   d) 3×10^{10} 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) Kirchoff’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) ½ 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) XL = XC ✔
    b) XL > XC
    c) XL < XC
    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 Bohr 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) $u = \varepsilon_o E^2/2$ ✅
    b) $u = \mu_o H^2$
    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) Secondary
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) Automatic 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) $Vx = V(Rx/Rtotal)$ ✅
   b) $Vx = IR$
   c) $Vx = V/R$
   d) $Vx = IR^2$
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) $1/Ceq = \Sigma(1/Ci)$ ✔
    b) $Ceq = \Sigma Ci$
    c) $Ceq = \Sigma C^2$
    d) $Ceq = 1/\Sigma C$
19. Capacitors in parallel:
    a) $Ceq = \Sigma Ci$ ✔
    b) $1/Ceq = \Sigma(1/Ci)$
    c) $Ceq = \sqrt{\Sigma Ci}$
    d) Ceq = None
20. Inductors in series:
    a) $Leq = \Sigma Li$ ✔
    b) $1/Leq = \Sigma(1/Li)$
    c) $Leq = \sqrt{\Sigma Li}$
    d) None
21. Inductors in parallel:
    a) $Leq = \Sigma Li$
    b) $1/Leq = \Sigma(1/Li)$ ✔
    c) $Leq = \sqrt{\Sigma Li}$
    d) None

22. RLC series circuit resonance condition:
    a) $XL = XC$ ✅
    b) $XL > XC$
    c) $XL < XC$
    d) $R = 0$
23. Reactance of inductor:
    a) $XL = 2\pi fL$ ✅
    b) $XL = 1/2\pi fL$
    c) $XL = L/f$
    d) $XL = 1/L$
24. Reactance of capacitor:
    a) $XC = 1/2\pi fC$ ✅
    b) $XC = 2\pi fC$
    c) $XC = 1/C$
    d) $XC = 2C$
25. Impedance of series RLC:
    a) $Z = \sqrt{(R^2 + (XL-XC)^2)}$ ✅
    b) $Z = R + XL + XC$
    c) $Z = R/(XL-XC)$
    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) $W = ½ LI^2$ ✅
    b) $W = ½ CV^2$
    c) $W = I^2R$
    d) $W = VI$
28. Energy stored in capacitor:
    a) $W = ½ CV^2$ ✅
    b) $W = ½ LI^2$
    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 → Current source + parallel R ✅
    b) Current source + parallel R → 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) Imax
    b) Imax/√2 ✅
    c) Imax/2
    d) √2 Imax
41. RMS value of sinusoidal voltage:
    a) Vmax
    b) Vmax/√2 ✅
    c) Vmax/2
    d) √2 Vmax
42. Average power in AC circuit:
    a) Vrms × Irms × cosθ ✅
    b) Vrms × Irms × sinθ
    c) Vrms × Irms
    d) Irms² × R
43. Impedance in series AC circuit:
    a) Z = R + j(XL - XC) ✅
    b) Z = R + XL + XC
    c) Z = R + 1/(XL - XC)
    d) Z = R² + (XL-XC)²
44. Admittance Y =
    a) 1/Z ✅
    b) Z
    c) R/Z
    d) Z/R
45. Phase angle φ =
    a) $\tan^{-1}((XL-XC)/R)$ ✅
    b) $\tan^{-1}(R/(XL-XC))$
    c) $\cos^{-1}((XL-XC)/R)$
    d) $\sin^{-1}((XL-XC)/R)$
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) Vm/√2
    b) Vm/√3 ✅

c) Vm/2
d) Vm

49. In AC circuits, instantaneous power:
    a) $p = vi$ ✅
    b) $p = i^2R$
    c) $p = v^2/R$
    d) $p = Vavg \times Iavg$
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^2R ✅
    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→0, 0→1 ✅
    b) 1→1, 0→0
    c) 1→1, 0→1
    d) None
5. De Morgan’s theorem states:
    a) (A·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·B
38. XNOR gate is equivalent to:
    a) AB + A’B’ ✅
    b) A’B + AB’
    c) A + B
    d) A·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) VCE × IC ✅
    b) VBE × IB

c) IC × IB
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) IB=0 ✅
    b) IC=0
    c) VCE small
    d) Active
53. Transistor saturation:
    a) VCE≈0 ✅
    b) IC≈0
    c) IB≈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 → Frequency ✅
   b) Frequency → Time
   c) Voltage → 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) $Fs \geq 2 \times fmax$ ✅
    b) $Fs < fmax$
    c) $Fs = fmax$
    d) None
24. Aliasing occurs if:
    a) $Fs < 2 \times fmax$ ✅
    b) $Fs \geq 2 \times fmax$
    c) $Fs = 2 \times fmax$
    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) $R = H \times$ 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 log2(1 + S/N) ✅
    b) C = B × 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 × fmax ✅
    b) fmax
    c) fmax / 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. HLDC 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