CUET PG Nanoelectronics - 2025 Question Paper with Solutions

Time Allowed :1 Hour	Maximum Marks :300	Total Questions :75

1. Determine the node voltages v_1 and v_2 for the given circuit:
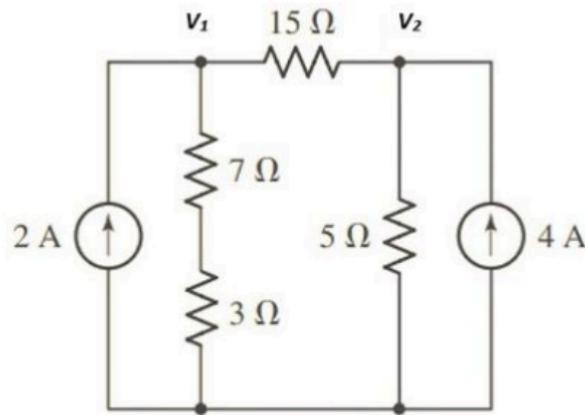
(1) $v_1 = 10\,\text{V}, v_2 = 20\,\text{V}$
(2) $v_1 = 20\,\text{V}, v_2 = 10\,\text{V}$
(3) $v_1 = 20\,\text{V}, v_2 = 20\,\text{V}$
(4) $v_1 = 10\,\text{V}, v_2 = 10\,\text{V}$

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2. Evaluate the mesh current i_1 in the given circuit:
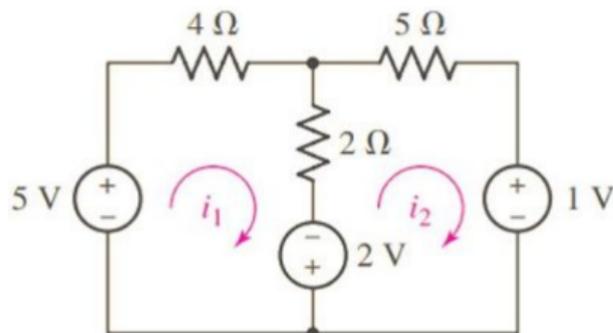
(1) $i_1 = 0.132$ A
(2) $i_1 = 1.132$ A
(3) $i_1 = 1.05$ A
(4) $i_1 = 0.105$ A

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3. In a circuit, the maximum power will be transferred only if the load resistance is equal to
....

(1) Source resistance (RS)
(2) Thevenin's equivalent resistance (RT)
(3) Four times of the source resistance (4RS)
(4) Four times of the Thevenin's equivalent resistance (4RT)

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4. Choose the correct statement from the options below:

(1) Non-linear distortion is expected to be minimum in Single Side-band Suppressed Carrier (SSB-SC) systems and Amplitude Modulation (AM).
(2) The AM system has a suppressed carrier system, which is cheaper than the performance point of view.
(3) The receiver of a suppressed carrier system is simpler and cheaper than that of the AM system.
(4) The AM system is always easier to analyze and more efficient.

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5. The voltage across the inductor for $t > 0$ in the given circuit is:
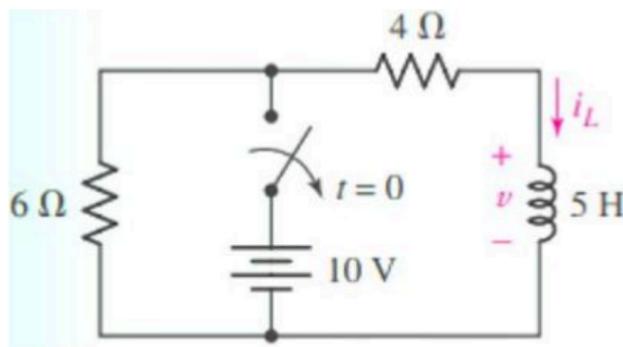
(1) $v = 25e^{\gamma t}$ V
(2) $v = 25e^{-\gamma t}$ V
(3) $v = -25e^{\gamma t}$ V

(4) $v = -25e^{-\gamma t}$ V

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6. Determine the Y11 and Y12 parameters for the circuit given below:
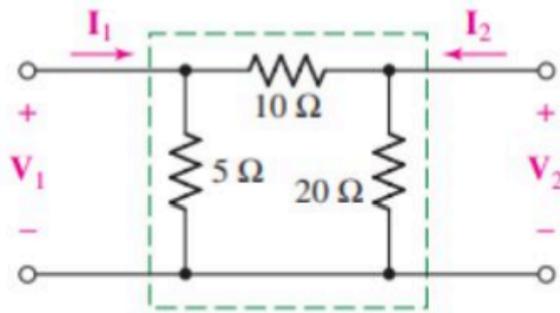
(1) $Y_{11} = 0.3\,\text{S}, Y_{12} = -0.1\,\text{S}$
(2) $Y_{11} = 0.3\,\text{S}, Y_{12} = 0.3\,\text{S}$
(3) $Y_{11} = -0.1\,\text{S}, Y_{12} = 0.3\,\text{S}$
(4) $Y_{11} = -0.3\,\text{S}, Y_{12} = 1.0\,\text{S}$

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7. The product of maxterms for the given boolean function is:

$$Y = ab + a'c$$

Choose the correct answer from the options given below:
(1) M_0, M_3, M_5, M_7
(2) M_1, M_3, M_5, M_7
(3) M_2, M_3, M_5, M_7
(4) M_1, M_2, M_5, M_7

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8. Characteristic equation (Q_{next}) is provided for the different flip-flops:

(A) $Q_{next} = SQ + RQ'$
(B) $Q_{next} = SQ' + RQ$
(C) $Q_{next} = TQ' + T'Q$

Choose the correct answer from the options given below:
(1) (A) and (D) only
(2) (B) and (D) only
(3) (A) and (C) only
(4) (C) and (D) only

9. The number of flip-flops required to implement a MOD-31 counter are:
(A) 25
(B) 5
(C) 12
(D) 24

10. The output frequency for an 8-bit Johnson counter is .... if the applied input frequency is 256 GHz.
(A) 128 GHz
(B) 64 GHz
(C) 128 MHz
(D) 256 MHz

11. Match List-I with List-II:

List-I (Counters)	List-II (Delay/Number of States)
(A) n-bit ring counter	(I) Number of states is 2^n
(B) MOD-2^n asynchronous counter	(II) Fastest counter
(C) n-bit Johnson counter	(III) Number of used states is n
(D) Synchronous counter	(IV) Number of used states is $2n$

Choose the correct answer from the options given below:
(1) (A) − (I), (B) − (II), (C) − (III), (D) − (IV)
(2) (A) − (I), (B) − (III), (C) − (II), (D) − (IV)
(3) (A) − (I), (B) − (II), (C) − (IV), (D) − (III)
(4) (A) − (III), (B) − (I), (C) − (IV), (D) − (II)

12. The percentage of the total power carried by the sidebands of the AM wave for tone modulation when the modulation index is 0.3 is:

(1) 30%
(2) 4.3%
(3) 43%
(4) 3%

13. Match List-I with List-II:

List-I (Modulation Schemes)	List-II (Wave Expressions)
(A) Amplitude Modulation	(I) $x(t) = A\cos(\omega_c t + km(t))$
(B) Phase Modulation	(II) $x(t) = A\cos(\omega_c t + k\int m(t)dt)$
(C) Frequency Modulation	(III) $x(t) = A + m(t)\cos\omega_c t$
(D) DSB-SC Modulation	(IV) $x(t) = m(t)\cos\omega_c t$

Choose the correct answer:
(1) (A)–(I), (B)–(II), (C)–(III), (D)–(IV)
(2) (A)–(IV), (B)–(III), (C)–(II), (D)–(I)
(3) (A)–(III), (B)–(IV), (C)–(I), (D)–(II)
(4) (A)–(I), (B)–(II), (C)–(IV), (D)–(III)

14. In amplitude modulation:

(A) The envelope detector operates properly, only if $(1/f_c) \leq RC \leq (1/f_m)$
(B) Vestigial sideband modulation is used in television broadcasting.
(C) Selective fading produces more distortion in SSB-SC systems than in DSB-SC.
(D) Efficiency of a suppressed carrier system is 100%, whereas in AM the maximum efficiency is only 33.3%.

Choose the correct answer from the options given below:
(1) (A), (B) and (D) only
(2) (B) and (C) only
(3) (A), (C) and (D) only
(4) (B), (C) and (D) only

15. The transmission efficiency of an ordinary AM signal with a modulation percentage of 80% is:

(1) 24.24%
(2) 48.49%
(3) 20.22%
(4) 33.33%

16. Consider the following statements:

(A) Built-in potential across a diode reduces with increase in temperature.
(B) Electron concentration of n-type semiconductor equals intrinsic concentration at Curie temperature.
(C) Drain current of MOSFET is a positive temperature coefficient (PTC).
(D) Collector current of BJT has a PTC.

Choose the correct statements:

(1) (A), (B) and (D) only
(2) (A), (B) and (C) only
(3) (A), (B), (C) and (D)
(4) (B), (C) and (D) only

17. In GaAsP, if $E_g = 1.9\,\text{eV}$, the emission wavelength is:

(1) 7538 Å
(2) 6538 Å
(3) 6533 Å
(4) 6133 Å

18. Match List-I with List-II:

List-I (Amplifiers)	List-II (Characteristics)
(A) CE Amplifier	(I) Current buffer circuit
(B) CB Amplifier	(II) Voltage buffer circuit
(C) CC Amplifier	(III) High current gain
(D) Darlington Amplifier	(IV) High power gain

Choose the correct answer:
(1) (A)–(I), (B)–(II), (C)–(III), (D)–(IV)
(2) (A)–(IV), (B)–(I), (C)–(II), (D)–(III)
(3) (A)–(III), (B)–(C), (C)–(IV), (D)–(I)
(4) (A)–(III), (B)–(IV), (C)–(I), (D)–(II)

19. The consequences of Early effect on BJT are:

(A) Effective base width reduces.
(B) Emitter injection efficiency and base transport factor increase.
(C) α and β decrease.
(D) Emitter injection efficiency and base transport factor decrease.

Choose the correct answer:
(1) (A) and (B) only
(2) (A), (B) and (C) only
(3) (C) and (D) only
(4) (B), (C) and (D) only

20. The DC collector current for a BJT with $\alpha = 0.99$, $I_B = 25\,\mu A$ and $I_{CBO} = 200\,nA$ is:

(1) 2.495 mA
(2) 2.518 mA
(3) 2.9 mA
(4) 250 nA

21. (A) Tunnel diode is a heavily doped pn junction diode that exhibits negative differential resistance.
(B) Stability factor (S) is the maximum for a voltage divider bias circuit.
(C) The operational amplifier works as a comparator circuit in open loop configuration.
(D) Biasing is done to set the quiescent point of the transistor in the middle of the DC load line.
Choose the correct statements from the options given below:
(1) (A), (C) and (D) only
(2) (A), (B) and (C) only
(3) (A), (B), (C) and (D)
(4) (B), (C) and (D) only

22. Arrange the following devices in increasing order of their input resistances:
(A) MOSFET
(B) BJT
(C) JFET
(D) PN junction diode

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

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23. Match List-I with List-II:

List-I (Effects)	List-II (Electronic Devices)
(A) Channel length modulation	(I) Zener diode
(B) Channel width modulation	(II) BJTs
(C) Early effect	(III) JFETs
(D) Tunneling effect	(IV) MOSFETs

Choose the correct answer:
(1) (A) $-$ (I), (B) $-$ (II), (C) $-$ (III), (D) $-$ (IV)
(2) (A) $-$ (IV), (B) $-$ (II), (C) $-$ (III), (D) $-$ (I)
(3) (A) $-$ (II), (B) $-$ (III), (C) $-$ (IV), (D) $-$ (I)
(4) (A) $-$ (III), (B) $-$ (IV), (C) $-$ (II), (D) $-$ (I)

24. Express v_{out} in terms of v_{in} for the given circuit, assuming the op-amp is ideal.
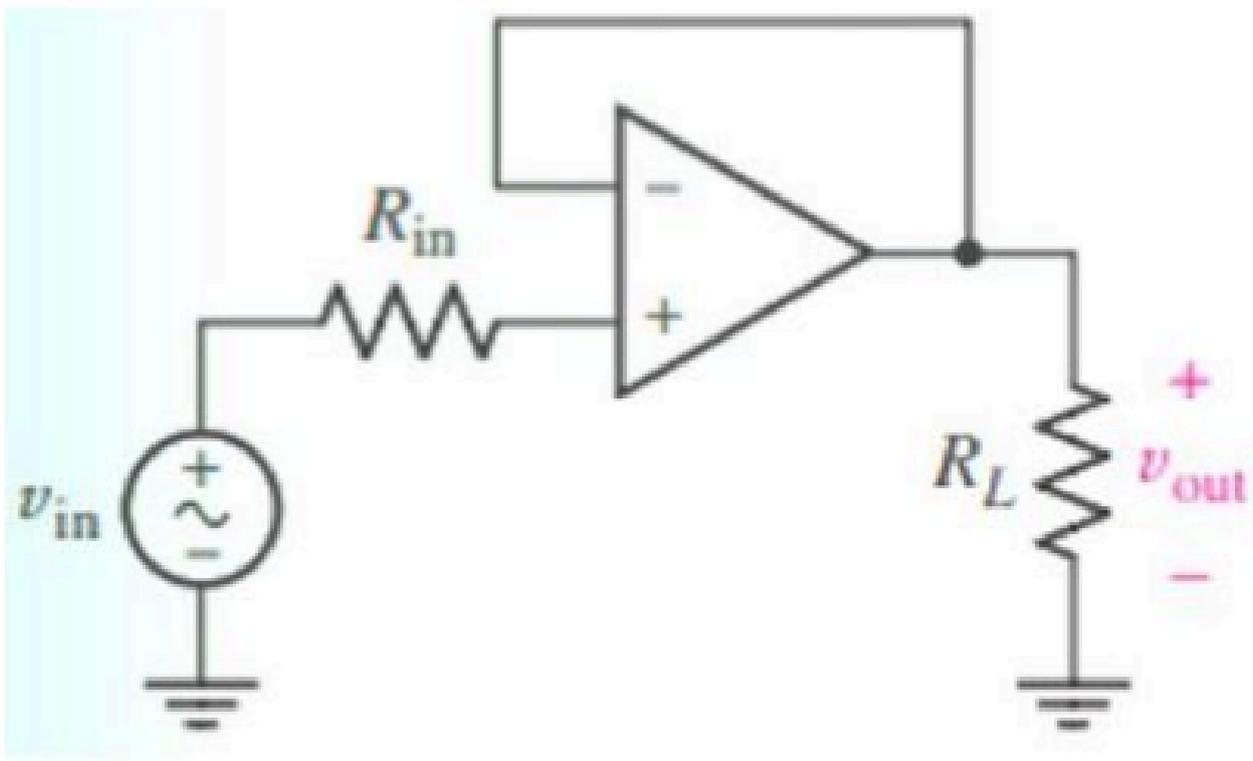
(1) $1.2v_{in}$
(2) v_{in}
(3) $0.5v_{in}$
(4) 4.0

25. Considering the op-amp to be ideal, the v_{out} is expressed as:
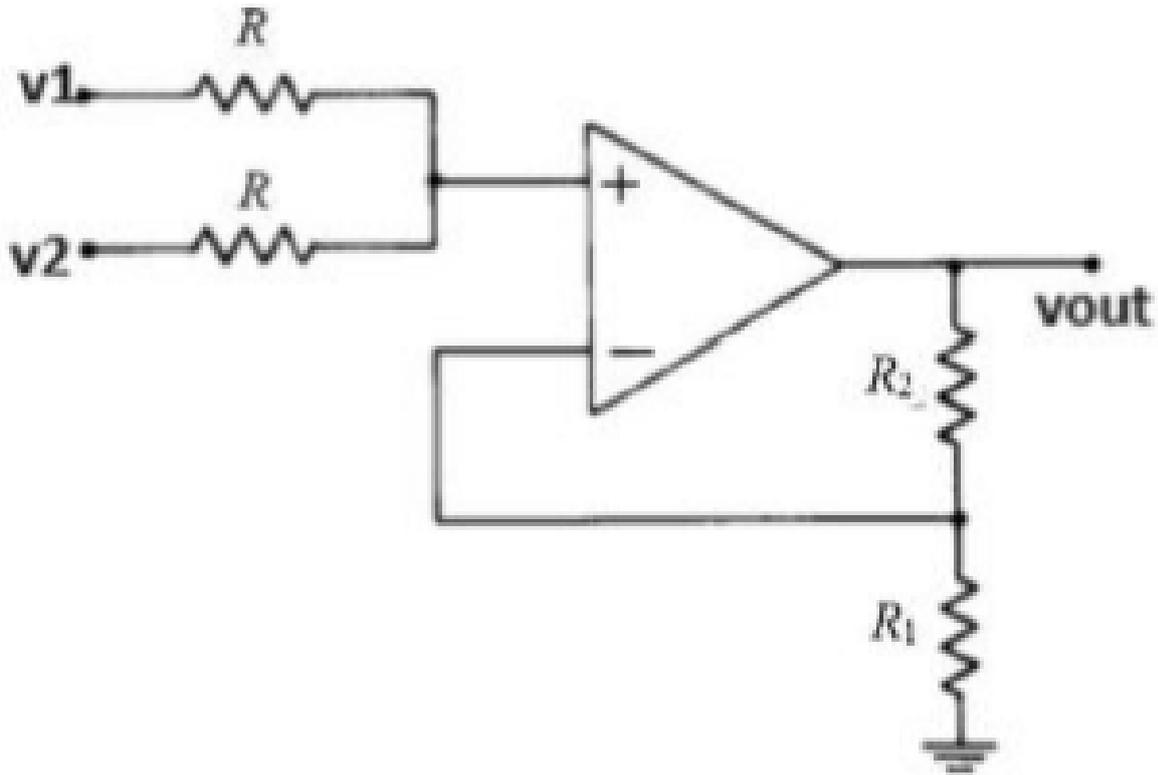
(1) $0.5(v_1 + v_2)(1 + \frac{R_2}{R_1})$
(2) $(v_1 + v_2)(1 + \frac{R_2}{R_1})$
(3) $1.5(v_1 + v_2)(1 + \frac{R_2}{R_1})$
(4) $0.5(v_1 - v_2)(1 + \frac{R_2}{R_1})$

6. Arrange the following fabrication steps of MOSFET from initials:
(A) Metallization
(B) Oxidation
(C) Etching
(D) Diffusion/Ion implantation

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

27. The cutoff frequency of a first order low pass filter for $R_1 = 1.2\,\mathrm{k\Omega}$ and $C_1 = 0.02\,\mu F$ is:

(1) 1.86 kHz
(2) 2.63 kHz
(3) 6.63 kHz
(4) 10.63 kHz

28. Match List-I with List-II:

| List-I (Electric field)	List-II (Mobility)
(A) Low electric field	(I) Mobility decreases by $1/E$
(B) Medium electric field	(II) Mobility decreases by $1/\sqrt{E}$
(C) High electric field	(III) Mobility remains constant

Choose the correct answer:
(1) (A) – (III), (B) – (II), (C) – (I)
(2) (A) – (I), (B) – (III), (C) – (II)
(3) (A) – (II), (B) – (III), (C) – (I)
(4) (A) – (III), (B) – (I), (C) – (II)

29. The unit of ratio of diffusion constant (D) and mobility (μ) is:

(1) $\text{cm}^2/\text{V-sec}$
(2) Volts
(3) cm^2/sec
(4) A/m^2

30. A silicon crystal is doped with a group III element, the electron concentration falls below intrinsic concentration by a factor of 10^6, so the concentration of impurity present is:

(1) $1.5 \times 10^{16}\,\text{cm}^{-3}$
(2) $1.5 \times 10^{10}\,\text{cm}^{-3}$
(3) $1.5 \times 10^{14}\,\text{cm}^{-3}$
(4) $2.25 \times 10^{14}\,\text{cm}^{-3}$

31. Choose the wrong option from the following for the given statement. Statement: Electric field is conservative.

(1) curl to be identically zero.
(2) potential difference between any two points is zero.
(3) gradient of a scalar potential gives magnitude of electric field.
(4) work done in a closed path inside the field is zero.

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32. Choose the correct answer from the options given below.
A. $\vec{\nabla} \times \vec{B} = \mu_0 \vec{J}$ represents Ampere's circuital law.
B. $\vec{\nabla} \cdot \vec{B} = 0$ represents magnetic monopole doesn't exist experimentally.
C. $\vec{\nabla} \times \vec{E} = 0$ represents the conservative nature of the electric field.
D. $\vec{\nabla} \times \vec{A} = 0$ represents the solenoidal condition for a vector field.

(1) (A), (B) and (D) only.
(2) (A), (B) and (C) only.
(3) (A), (B), (C) and (D).
(4) (A), (C) and (D) only.

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33. Match List-I with List-II

List-I	List-II
(A) Faraday's Law	(i) $\frac{\rho}{\epsilon_0}$
(B) Conservation Law	(ii) $\vec{\nabla} \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$
(C) Ohm's Law	(iii) $\vec{\nabla} \times \vec{A} = 0$
(D) Gauss's Law	(iv) $\vec{J} = \sigma \vec{E}$

(1) (A) - (II), (B) - (III), (C) - (IV), (D) - (I)
(2) (A) - (I), (B) - (II), (C) - (IV), (D) - (III)
(3) (A) - (III), (B) - (I), (C) - (IV), (D) - (II)
(4) (A) - (II), (B) - (I), (C) - (III), (D) - (IV)

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34. Gauss's law in magnetostatics is expressed as,

(1) $\oint \vec{B} \cdot d\vec{S} = 0$
(2) $\oint \vec{B} \cdot d\vec{I} = 0$
(3) $\oint \vec{B} \cdot \vec{n}dV = 0$
(4) $\oint \vec{B} \cdot d\vec{l} = \mu_0 I_{\text{enc}}$

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35. If in a free space, the electric field is given as:

$$\vec{E} = 20\cos(\omega t - 50x)\hat{y} \, \mathbf{V/m}$$

then, the expression of displacement current density J_d is:

(1) $-20\omega\epsilon_0 \cos(\omega t - 50x)\hat{y} \, \mathrm{A/m}^2$
(2) $-20\omega\epsilon_0 \sin(\omega t - 50x)\hat{y} \, \mathrm{A/m}^2$
(3) $-10\omega\epsilon_0 \sin(\omega t - 50x)\hat{y} \, \mathrm{A/m}^2$
(4) $-20\omega \sin(\omega t - 50x)\hat{y} \, \mathrm{A/m}^2$

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36. If electric $\vec{E}(r,t)$ and magnetic $\vec{B}(r,t)$ fields are defined as

$$\vec{E}(r,t) = \vec{E}_0 e^{i(k\cdot r - \omega t)}\hat{n}, \quad \vec{B}(r,t) = \frac{1}{c}\hat{k} \times \vec{E}(r,t)$$

where k is the propagation vector and $\hat{n}$ is the polarization vector. E and B are transverse in nature, if they satisfy which of the following conditions?

(1) $\hat{n} \times k = 0$
(2) $\hat{n} \cdot k = 0$
(3) $\hat{n} \times \hat{k} = 0$
(4) $k \cdot r = 0$

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37. The characteristic length scale of nanomaterials is:

(1) 1-100 nm
(2) 1-500 nm
(3) 1-200 nm
(4) 1-300 nm

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38. Match List-I with List-II

Quantum Structure   Delocalization Dimensions

(A) Quantum wells   (I) 1
(B) Quantum wires   (II) 2
(C) Quantum dots   (III) 3
(D) Bulk conductors   (IV) 0

(1) (A) - (II), (B) - (III), (C) - (IV), (D) - (I)
(2) (A) - (I), (B) - (II), (C) - (III), (D) - (IV)
(3) (A) - (III), (B) - (I), (C) - (IV), (D) - (II)
(4) (A) - (II), (B) - (I), (C) - (III), (D) - (IV)

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39. If the diameter of the chiral carbon nanotubes increases, then

(1) the band gap of semiconducting chiral carbon nanotubes decreases linearly
(2) the band gap of semiconducting chiral carbon nanotubes increases linearly
(3) the band gap of semiconducting chiral carbon nanotubes decreases exponentially
(4) the band gap of semiconducting chiral carbon nanotubes increases exponentially

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40. The Extreme Ultraviolet (EUV) lithography employs .... wavelength.

(1) 13.5 nm
(2) 53.5 nm

(3) 100 nm
(4) 50 nm

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41. Attenuation in optical fibre can be measured in:

(1) KdB/m
(2) dB/m
(3) dB/km
(4) dB/mm

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42. .... nanoparticles are extraordinarily efficient for clinical diagnostic purposes as they give strong signatures in optical absorption, fluorescence spectroscopy, X-Ray diffraction, and electrical conductivity.

(1) Silver
(2) Copper
(3) Gold
(4) Iron

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43. Bio-functionalization of magnetic nanoparticles has been extensively used for the development of biosensors such as:

(1) FeO
(2) ZnO
(3) COH
(4) GaAs

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44. A multiplexer (MUX)
(A) is a parallel to serial converter
(B) is also known as data distributor
(C) can be used as a logic function generator
(D) switch the data from several lines to one line

Choose the correct answer from the options given below:

(1) (A), (B), (C) and (D)
(2) (A), (B) and (D) only
(3) (B), (C) and (D) only
(4) (A), (C) and (D) only

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45. A 32:1 Mux can be designed using:

(1) two 16:1 Muxs and one two-input OR gate
(2) two 16:1 Muxs and one two-input AND gate
(3) two 16:1 Muxs and one two-input NOR gate
(4) two 16:1 Muxs only

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46. In the first window of optical fibre, light sources are generally:

(1) GaAlP
(2) GaAlBr
(3) GaAlAs
(4) GeAlAs

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47. Following statements are given in reference to 8085 Microprocessor:
(A) Its memory size is 64 KB
(B) It is a 40-pin IC
(C) Its clock frequency lies between 3 to 5 MHz
(D) It has 16 bit of each data and address lines.

Choose the correct answer from the options given below:

(1) (A), (B) and (D) only
(2) (A), (B) and (C) only
(3) (A), (B), (C) and (D)
(4) (B), (C) and (D) only

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48. Fibre optic sensors may be classified into three categories. Choose the incorrect option.

(1) Intensity-modulated sensors
(2) Phase sensors

(3) Diffraction sensors
(4) Conducting sensors

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49. Which of the following is the most appropriate transmission frequency in optical fibre?

(1) 10^9 Hz
(2) 10^{11} Hz
(3) 10^{14} Hz
(4) 10^4 Hz

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50. Which part of optical fibre has a higher refractive index:

(1) Core
(2) Cladding
(3) Seath
(4) Both Cladding and Seath

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51. Match List-I with List-II

List-I (Instructions)	List-II (Addressing Mode)
(A) LDA 2100 H	(I) Immediate
(B) RAL	(II) Register
(C) ADD C	(III) Direct
(D) ANI 08 H	(IV) Implied

1. (A) = (I), (B) = (II), (C) = (III), (D) = (IV)
2. (A) = (III), (B) = (IV), (C) = (I), (D) = (II)
3. (A) = (I), (B) = (II), (C) = (IV), (D) = (III)
4. (A) = (III), (B) = (IV), (C) = (II), (D) = (I)

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52. (A) MOV A, C is a one-byte instruction.
(B) OUT 03 H is a two-byte instruction.
(C) ANI 76 H is a three-byte instruction.
(D) STA 3000 H is a three-byte instruction.

1. (A), (B), and (D) only
2. (A), (B), and (C) only
3. (A), (B), (C), and (D)
4. (B), (C), and (D) only

53. Which of the following statements about hydrogen peroxide is INCORRECT?

1. It is a chemical threat agent as its excessive concentration as a product of industry and from atomic power stations affects the environment.
2. It can not be used for the disinfection of water pools, food, and beverage packages as it is a chemical threat agent.
3. It is the most valuable marker for oxidative stress and recognized as one of the major risk factors in the progression of disease-related pathophysiological complications in diabetes.
4. It is the most valuable marker for inflammatory processes and a mediator for apoptotic cell death.

54. Match List-I with List-II

List-I (Data Bus Status Output)	List-II (Status Signals)
(A) Memory read	(I) 0, 1, 1
(B) Op-code fetch	(II) 0, 1, 0
(C) INTR acknowledge	(III) 0, 0, 1
(D) Memory write	(IV) 1, 1, 1

1. (A) = (I), (B) = (II), (C) = (III), (D) = (IV)
2. (A) = (III), (B) = (IV), (C) = (I), (D) = (II)
3. (A) = (IV), (B) = (III), (C) = (II), (D) = (I)
4. (A) = (II), (B) = (I), (C) = (IV), (D) = (III)

55. .... refers to the inability to faithfully repeat recorded data output when measuring a range of values and scanning from different directions.

1. Selectivity
2. Resolution
3. Hysteresis
4. Detection limit

56. .... is the vector address of the TRAP interrupt.
1. 003C H
2. 0024 H
3. 002C H
4. 0034 H

57. What is the word length of an 8-bit microprocessor?
1. 16 bit
2. 32 bit
3. 8 bit
4. may vary in between 8 bit to 32 bit

58. To expand a 4-bit parallel adder to an 8-bit parallel adder, we can
(A) use two 4-bit adders and connect the sum output of one to the input bit of the other
(B) use four 4-bit adders with no interconnections
(C) use two 4-bit adders with the carry output of one connected to the carry input of the other
(D) use eight 4-bit adders with no interconnections

1. (A), (C) only
2. (B), (D) only
3. (A) only
4. (C) only

59. Which of the following statement(s) about Digital-to-Analog (DAC) converter is/are correct?
(A) DAC is said to be monotonic if its output decreases as the binary input is incremented from one value to the next.
(B) Ideally, the output of a DAC should be zero when the binary input is zero.
(C) The operating speed of a DAC is usually specified by giving its settling time.
(D) Resolution is the reciprocal of the number of discrete steps in the full-scale output of the DAC.

1. (A), (B), and (D) only
2. (A), (B), and (C) only
3. (A), (B), (C), and (D)
4. (B), (C), and (D) only

60. Major problems with the large-scale utilization of carbon nanotubes
(A) synthesis in pure forms
(B) dispersion in solvents
(C) reducing their length
(D) tailoring into a desired orientation

1. (A), (B), and (D) only
2. (A), (B), and (C) only
3. (A), (B), (C), and (D)
4. (B), (C), and (D) only

61. Match List-I with List-II Choose the correct answer from the options given below:

List-I	List-II
(A). Purification	(I). to improve interactions with a solid or liquid matrix
(B). De-agglomeration	(II). methods include thermal annealing in air or oxygen; acid treatment, microfiltration
(C). Chemical functionalization	(III). can be made in a carbon arc, but burning a hydrocarbon feedstock with strict control of the oxygen supply is a more controllable method
(D). Fullerenes	(IV). methods include ultrasonication, electrostatic plasma treatment, electric field manipulation and polymer wrapping, ball milling

(1) (A) - (I), (B) - (III), (C) - (II), (D) - (IV)
(2) (A) - (II), (B) - (III), (C) - (IV), (D) - (I)
(3) (A) - (I), (B) - (III), (C) - (IV), (D) - (II)
(4) (A) - (II), (B) - (IV), (C) - (I), (D) - (III)

62. In nanomaterials production, according to Aufbau principle the self-assembly of complicated structures takes place in a hierarchical fashion in the following sequence:
(A) the linear chains are bundled to form two-dimensional monolayers
(B) single molecules join up to form linear chains
(C) a finite number of independent molecules
(D) the two-dimensional monolayers are stacked to form the final three-dimensional crystal
Choose the correct answer from the options given below:

(1) (A) - (B), (C) - (D)
(2) (A) - (C), (B) - (D)

(3) (B) - (A), (C) - (D)
(4) (C) - (B), (A) - (D)

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63. The number of cubes of each side 1 nm and the collective surface area that can be carved out from a cube with each side of 1 m are respectively:

(1) 1×10^{27} and 6000 km²
(2) 1×10^{27} and 600 km²
(3) 1×10^{25} and 5000 km²
(4) 1×10^{27} and 500 km²

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64. The process of transferring a pattern into a reactive polymer film which will subsequently be used to replicate that pattern into an underlying thin film is called:

(1) Electrochemical Deposition
(2) Lithography
(3) Mechanical Exfoliation
(4) Electroless Deposition

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65. The process of synthesizing large polymer molecules is:

(1) top-down approach
(2) bottom-up approach
(3) spontaneous process
(4) forced process

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66. Match List-I with List-II

List-I	List-II
Nanostructures and Nanomaterials fabrication technologies	**Definitions**
(A). Vapor phase growth	(I). including vapor-liquid-solid growth for nanowires
(B). Liquid phase growth	(II). including laser reaction pyrolysis for nanoparticle synthesis and atomic layer deposition for thin film deposition.
(C). Solid phase formation	(III). including colloidal processing for the formation of nanoparticles and self assembly of monolayers.
(D). Hybrid growth	(IV). including phase segregation to make metallic particles in glass matrix and two-photon included polymerization for the fabrication of three-dimensional photonic crystals.

Choose the correct answer from the options below:
(1) (A) = (I), (B) = (II), (C) = (IV), (D) = (III)
(2) (A) = (II), (B) = (III), (C) = (I), (D) = (IV)
(3) (A) = (I), (B) = (III), (C) = (IV), (D) = (II)
(4) (A) = (III), (B) = (IV), (C) = (II), (D) = (I)

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67. The process of transferring growth species from a source or target and depositing them on a substrate to form a film is called:

(1) Molecular Beam Epitaxy
(2) Physical Vapor Deposition
(3) Chemical Vapor Deposition
(4) Atomic Layer Deposition

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68. In X-ray diffraction, a collimated beam of X-rays, with most appropriate wavelength ranging from .... is incident on a specimen and is diffracted by the crystalline phases of the specimen:

(1) 0.1 to 2 Å
(2) 5 to 10 Å
(3) 10 to 20 Å
(4) 20 to 30 Å

69. .... are electromagnetic radiation with typical photon energies in the range of 100 eV to 100 keV:

(1) X-rays
(2) Infrared rays
(3) Optical spectroscopy
(4) Raman spectroscopy

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70. Measurement of grain size by using X-ray diffraction line broadening can be done by:

(1) Bragg's Law
(2) Debye-Scherrer Formula
(3) Total Internal Reflection
(4) Moseley Law

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71. Quantum well lasers were first fabricated using the .... material systems.

(1) InGaAsN/GaAs
(2) GaAs/AlGaAs
(3) InGaAsP/InP
(4) GaAs/InP

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72. The measurement of Nitric Oxide (NO) is quite difficult due to its .... half-life and .... reactivity with other biological components such as superoxide, oxygen, thiols.

(1) Short, High
(2) Short, Low
(3) Long, High
(4) Long, Low

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73. In the ISFET pH measurement system, the voltage circuit has .... impedance and the current circuit has .... impedance.

(1) High, Low
(2) zero, High

(3) Low, zero
(4) Low, High

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74. .... type of electrochemical detection measures the electric current associated with the electron transfer involved in redox processes whereas .... type of electrochemical detection measures conductance or capacitance changes associated with changes in the overall ionic medium between the two electrodes.

(1) Amperometry, potentiometry
(2) Potentiometry, impedance spectroscopy
(3) Amperometry, impedance spectroscopy
(4) Potentiometry, amperometry

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75. Which of the following statements is incorrect about Light-addressable potentiometric sensors (LAPS)?

(1) In the LAPS with EIS structure, a semiconductor substrate (silicon) is covered with an insulator (SiO2).
(2) An enzyme deposited on the LAPS surface allows one to observe the spatial distribution of a specific substrate.
(3) In the LAPS with electrolyte-insulator-semiconductor (EIS) structure, a semiconductor substrate (silicon) is covered with an insulator (SiO2).
(4) A sensing ion-selective layer, for instance, pH-sensitive S3N4, is deposited on the bottom of the insulator.