Mall Reddy Engineering College (Autonomous)

I B.Tech II Sem (MR15) II Mid Objective questions

Sub: Applied Physics

Common for all branches

MODULE III B - SEMICONDUTOR PHYSICS OBJECTIVE QUESTIONS

1. In N type semiconductor majority charge carriers are
   a. Electrons b. holes c. protons d. neutrons
2. In p type semiconductor majority charge carriers are
   a. Electrons b. holes c. protons d. neutrons
3. The direct transition of electrons from conduction band to valence band is observed in
   a. Direct band gap semiconductor b. Indirect bandgap semiconductor c. in both
   d. none of these
4. The in direct transition of electrons from conduction band to valence band is observed in
   a. Direct band gap semiconductor b. Indirect bandgap semiconductor c. in both
   d. none of these
5. A semiconductor is different from conductor because it posses a energy band gap
   a. that is of the order of 0.2 – 0.4 eV
   b. that is overlapping the valence band
   c. that does not exist
   d. that is very far apart from valence band
6. for an intrensic semiconductor
   a. the recombination rate is not same as the generation rate
   b. the recombination rate is same as the generation rate
   c. the recombination rate is not related to the generation rate
   d. none of these
7. An intrensic semiconductor is different from an extrensic semiconductor as
   a. there is addition of no external elements to the pure semiconducting element
   b. there is addition of some external elements to the pure semiconducting element
   c. there is no change in the forbdden gap
   d. all of these
8. The fermi level in the intrensic semiconductor
   a. lies midway between the valence band and the conduction band
   b. lies towards the conduction band
   c. lies towards the valence band
   d. does not exist
9. The fermi level in the n type extrensic semiconductor
   a. lies midway between the valence band and the conduction band
   b. lies towards the conduction band
   c. lies towards the valence band

d. does not exist

10. The fermi level in the n type extrensic semiconductor
    a. lies midway between the valence band and the conduction band
    b. lies towards the conduction band
    c. lies towards the valence band
    d. does not exist
11. The fermi level in the p type extrensic semiconductor
    a. lies midway between the valence band and the conduction band
    b. lies towards the conduction band
    c. lies towards the valence band
    d. does not exist
12. The diode current consists of
    a. both the drift current and difussion current
    b. forward current
    c. reverse current
    d. all of these
13. An LED uses
    a. A conductor junction
    b. A seconducting junction
    c. An insulating junction
    d. A quasi-element junction
14. When is a PN junction formed?
    a. In a depletion region
    b. In a large reverse biased region
    c. The point at which two opposite doped materials come together
    d. Whenever there is a forward voltage drop
15. In p type material minority carrier would be
    a. Electrons
    b. Holes
    c. Electron hole pair
    d. All the above
16. In n type semiconductor the minority carrier would be
    a. Electrons
    b. Holes
    c. Electron hole pair
    d. All the above
17. When electron jumps from the valence band to conduction band, a gap is created, that gap is called as
    a. Energy gap
    b. Hole
    c. Electron pair
    d. Recombination
18. In intrensic semiconductors, the fermi energy level depends on
    a. Temperature

b. Doping concentration
c. Both a and b
d. None of these

19. In extrensic semiconductors, the fermi energy level depends on
    a. Temperature
    b. Doping concentration
    c. Both a and b
    d. None of these
20. The green colour in the LED is due to
    a. The mixture of Gallium phosphide (GaP)
    b. The mixture of Gallium, Arsenide and Phosphide (GaAsP)
    c. The mixture of Gallium arsenide (GaAS)
    d. All the above
21. The yellow colour in the LED is due to
    a. The mixture of Gallium phosphide (GaP)
    b. The mixture of Gallium, Arsenide and Phosphide (GaAsP)
    c. The mixture of Gallium arsenide (GaAS)
    d. All the above
22. The infrared LED is due to
    a. The mixture of Gallium phosphide (GaP)
    b. The mixture of Gallium, Arsenide and Phosphide (GaAsP)
    c. The mixture of Gallium arsenide (GaAS)
    d. All the above
23. Liquid crystal display (LCD) is made up of
    a. Solid
    b. Liquid
    c. Mixture of solid and liquid
    d. None of these
24. The hall voltage is directly proportional to
    a. Current
    b. Electric field
    c. Magnetic flux density
    d. All of above
25. Electric field strength related to hall voltage is given by
    a. $V_H d$
    b. V_H/d
    c. $V_H E$
    d. Ed

Answers:

1. a
2. b
3. a

4. b
5. a
6. b
7. c
8. a
9. b
10. b
11. c
12. a
13. b
14. c
15. a
16. b
17. b
18. d
19. c
20. a
21. b
22. c
23. c
24. c
25. b

MODULE IV - NANOTEHNOLOGY

1. Nanotechnology was brought into day light by delivering lectures by _____
   a) Feynman b) Einstien c) Newton d) Max Planck
2. Nanostructures have sizes in between_____
   a) 1 and 100Å b) 1 and 100nm c) 100 and 1000nm d) none of above
3. Nanotechnology deals with _____of nanostructures into useful nanoscale Devices such as electronic circuits and mechanical devices at the molecular level
   a) The design b) manufacturing c) applications d) all the above
4. Surface area to volume ratio _____for nanomaterials.
   a)very large b) very less c) moderate d) none
5. Bulk Materials When reduced to nanopaticles will Show_____optical&electrical properties
   a) Same b) different c) Both a and b d) None
6. The different Sized Nanoparticles Scatter different Wavelengths of light incident on It

And they appear with_____

a) Same colour b) different colours c)colourless d)None of these

7. Choose Correct Statement_____
   a)Porous silicon exhibits red photoluminescence.
   b)Nanogold Particles can be Orange,purple,red or greenish in colour depending on their grain size
   c)Nanopaticles copper is transparent
   d) All the above
8. Bulk Materials When reduced to nanopaticles will Show_____ Properties changes
   a) Optical b) electrical c) thermal d) all
9. By reducing the Size of metal particles from bulk to nano,the energy bands are
   a) Narrower b) remains same c) wider d) none of these
10. Choose the correct statement_____
    a) Single Walled carbon nanotube can act as a transistor
    b) Single Walled carbon nanotube with a natural junction act as a rectifying diode
    c) Carbon nanotubes can act as axles in nanomachines
    d) All the above
11. Nanoparticles are produced using_____
    a) Sol-gel method b) ball milling method c) chemical vapour deposition d) all
12. Carbon nanotubes are _____
    a) 10 times stiffer than steel
    b) Robust
    c) Having electrical conductivity 1000 times more than copper
    d) All the above
13. Nano materials are used in_____
    a)micro electronics
    b)textiles
    c)medicine
    d) all the above
14. In medical field nanotechnology is used_____
    a) To repair damage tissue
    b) Iron particles are used in cancer treatment
    c) For the development of diagnostic devices.
    d) All the above
15. Cloths made up of nanofibres are_____
    a)Water and stain repellent b) Wrinkle free
    c) less frequently washed d) all
16. 1nm=_____
    a)10^{-9} m b) 10^{-8} m c) 10^{-7} m d) 10^{-6} m
17. carbon nanotubes can have_____ type of structures.

    a) one b) two c) three d) four

18. Quantum dot is an example of_____

a) One dimensional nano materials

b) Two dimensional nano marterials

c) Three dimensional nano materials

d) All the above

19. Nano wires are Example of_____

a) One dimensional nano materials

b) Two dimensional nano marterials

c) Three dimensional nano materials

d) All the above

20.In Quantum Confinement effect, the energy levels of_____ changes

a) electrons b) atoms c) molecules d) nanoparticles

21. With increase in diameter of a carbon nanotube, its energy gap

a) Increases b) decreases c) first increases and then decreases d) remains constant

22.The advantage of sol-gel method in fabrication of nanoparticles is_____

a) It is a Low temperature process

b) the product can be obtained in any form

c) it is polished to optical quality

d) all the above

23. In the fabrication of nanopartcles , bulk material is crushed into nanoparticles in___ method

a) chemical Vapour deposition b) ball milling

c) laser ablation d) sol-gel method

24.For a sphere nano particle of radius 'r', surface area to volume ratio is given by

a) $\frac{2}{r}$ b) $\frac{3}{r}$ c) $\frac{4}{r}$ d) $\frac{5}{r}$

25. For a cubic nanoparticles of side 'a', surface area to volume ratio is given by

a) $\frac{3}{a}$ b) $\frac{4}{a}$ c) $\frac{5}{a}$ d) $\frac{6}{a}$

26. Diameter of one carbon atom is_____

a) 0.5nm b) 0.05nm c) 0.15nm d) 5nm

27. The method of producing very small structures from large pieces of materials is called_____ techniques

a) bottom up b) top down c) middle down d) all

28. The method of synthesizing nanomaterials by atom by atom attachment is known_____ techniques

a) bottom up b) top down c) middle down d) all

29.Young's modulus value of single walled nanotubes is about_____

a)1 Kilopascal b)1 Millpascal c) 1 Terapascal d) 1 Gigapascal

30.Crystal growth is an example for_____ technique

a) Top down b) Bottom up c) Both a &b d) none of these

31.Extended tubes of rolled graphite sheets are called_____

a) Nano tube b) carbon nanotube c) Fullerene d) none of these

32.Gold nanospheres of 100nm appear_____

a) red in colour b) blue in colour c) orange in colour d) violet in colour

33. In which technique laser light is used to prepare nanomaterials_____

a) Sol-gel b) chemical vapour deposition c) laser ablation d) ball milling

34.Examples of Physical methods for preparation of nano materials_____

a) Sol-gel b) Chemical vapour deposition c) co-precipitation d) none of these

35.Examples of chemical methods for preparation of nano materials_____

a) Ball milling b) Laser ablation c) both a&b d) Sol-gel

36.Aerogel is a_____

a) Foam-type nanomaterial b)nanometallic material

c) non-metallic nanomaterial d) all the above

37.Nanosized particles are chemically very active because_____

a) of their small size b) Due to lower no of atoms

c) number of surface atoms more d) number of surface atoms less

38.Bulk silicon is an insulator which becomes a_____ in nanophase

a) Semiconductor b) insulator c) conductor d) both a& b

39.One nanometer is equal to the width of _____no of atoms

a) One or two b) two or three c) three or four d) none of these

40.The thermal conductivity of carbon nanotubes is _____no of times larger than silver

a) two b) three c) four d) ten

41.Electrical conductivity of carbon nanotubes _____ times larger than copper

a) 1000 b) 2000 c) 500 d) 100

42.In air crafts, by decreasing the grain size of nanomaterials the fatigue strength increases and the fatigue life

Increases as much as_____

a) 50% b) 100% c) 200% d) 300%

43.In new generation batteries, the separator plates are made up of with nanocrystalline nickel and metal

Hydrides because they_____

a) Hold more energy b) are long losting c) require are recharging d) all

44.Nano crystalline silicon nitride and silicon carbide are used in the manufacturing of___

a) high strength springs b) ball bearings and value lifters

c) both a and b d) None of the above

45.Quantum dots are_____

a) tiny particles of semiconductors

b) conductors

c) Insulators

d) all

46.nanocollioids are _____

a) Suspended nanoparticles in liquid c) Both a & b

b) Suspended bulkparticles in liquid d) none

47.Nano powders are_____

a) Agglomeration of nanoparticles b) Agglomeration of nanoclusters

c) Both a& b d) none

48._____ method is used synthesizing non metallic inorganic materials at low temperatures.

a) Ball milling b) laser ablation c) Sol-gel d) none

49.The Inner diameter of Multi Wall Carbon nanotube is_____

a) 1.5nm to 10nm b) 1.5nm to 15nm c) 1.5nm to 12nm d) 1.5nm to 9nm

50.The length of multiwall carbon nanotube is_____

a) 1nm b) 1cm c) 1mm d) 1µm

KEY:

1. a	21. b	41. a
2. b	22. d	42. d
3. d	23. b	43. d
4. a	24. b	44. c
5. b	25. d	45. a
6. b	26. c	46. a
7. d	27. b	47. c
8. d	28. a	48. c
9. a	29. c	49. b
10. d	30. b	50. c
11. d	31. b	
12. d	32. c	

13. d
14. d
15. d
16. a
17. b
18. c
19. b
20. a
33. c
34. d
35. d
36. a
37. c
38. c
39. c
40. D

MODULE V – ELECTROMAGNETIC THEORY

1. Operating del operator on a scalar field results in
    a. Gradient
    b. Curl
    c. Divergence
    d. None of the above
2. The dot product of del operator on a vector field results in
    a. Gradient
    b. Curl
    c. Divergence
    d. None of the above
3. The cross product of del operator on a vector field results in
    a. Gradient
    b. Curl
    c. Divergence
    d. None of the above
4. The total electric flux through a closed surface enclosing a charge equal to $1/\varepsilon_0$ times the magnitude of the charge enclosed is called
    a. Ampere's law
    b. Faraday's law
    c. Lenz's law
    d. Gauss law
5. From Gauss law of magneto statics, the total magnetic flux enclosed in a surface is
    a. 1
    b. 0
    c. Maximum
    d. Minimum

6. The line integral of the tangential component of the magnetic field over any closed path is equal to the amount of the current enclosed by the loop. This is the statement for
    a. Ampere's law
    b. Faraday's law
    c. Lenz's law
    d. Gauss law
7. The magnetic flux density B at any point located at a distance r from a thin uniform wire carrying current I is given by
    a. $B = 2\pi r / \mu_0 I$
    b. $B = \mu_0 I / 2\pi r$
    c. $B = 2\pi / \mu_0 rI$
    d. $B = 2\pi r / \mu_0$
8. Current is induced in the loop as long as relative motion occurs between the magnet and the loop. This phenomenon is known as
    a. Electromotive force
    b. Electromagnetic induction
    c. Electromagnetic wave
    d. Electro dynamics
9. The rotation of any vector is represented by
    a. Gradient
    b. Divergence
    c. Curl
    d. None of the above
10. The net flow of a vector quantity is represented by
    a. Gradient
    b. Divergence
    c. Curl
    d. None of these

11. $\vec{F} . \vec{S}$ *is*:
    a. A scalar
    b. A vector
    c. Neither scalar nor vector.
    d. A tensor
12. $\vec{r} \times \vec{F}$ *is*:
    a. A scalar
    b. A vector
    c. Neither scalar nor vector
    d. A tensor
13. Maxwell's …….. equation represents Guass law of Electricity
    a. First
    b. Second
    c. Third
    d. Fourth
14. Maxwell's …….. equation represents Guass law in magnetostatics
    a. First

b. Second
c. Third
d. Fourth

15. Maxwell's …… equation represents Faraday's law of electromagnetic induction.
    a. First
    b. Second
    c. Third
    d. Fourth
16. Maxwell's ……. equation represents modified Ampere's law.
    a. First
    b. Second
    c. Third
    d. Fourth
17. The rule for determining the direction of induced current in a closed conducting loop is given by
    a. Ampere
    b. Lenz
    c. Faraday
    d. Newton
18. "An induced current in a closed conducting loop will appear in such a direction that it opposes the original flux change", this is the statement for
    a. Lenz's law
    b. Ampere's law
    c. Faraday's law
    d. Maxwell's law
19. The correction in Ampere's law was given by
    a. Newton
    b. Faraday
    c. Maxwell
    d. Federick Lenz
20. In a fluid while it is flowing, if divergence is positive at any point then the fluid expands and the density at that point
    a. Increases
    b. Decreases
    c. Remains same
    d. zero
21. In a fluid while it is flowing, if divergence is negative at any point then the fluid contracts and the density at that point
    a. Increases
    b. Decreases
    c. Remains same
    d. zero
22. In a fluid while it is flowing, if divergence is zero then the density of the fluid remains same all along its flow. Such fluids are called
    a. Compressible fluids
    b. Incompressible fluids
    c. Expandable fluids

d. Pressure fluids

23. The curl of a velocity vector results in
    a. Angular displacement
    b. Angular distance
    c. Angular intensity
    d. Angular velocity
24. If del cross vector V is equal to zero then the vector is called
    a. Irrotational vector
    b. Rotational vector
    c. Skew vector
    d. Symmetric vector
25. The gradient operator is defined by
    a. $\underset{\nabla}{\rightarrow}=\underset{i}{\rightarrow}\frac{\partial}{\partial x}+\underset{j}{\rightarrow}\frac{\partial}{\partial y}+\underset{k}{\rightarrow}\frac{\partial}{\partial z}$
    c. $\nabla=\frac{\partial}{\partial x}+\frac{\partial}{\partial y}+\frac{\partial}{\partial z}$
    b. $\underset{\nabla}{\rightarrow}=\underset{i}{\rightarrow}\frac{\partial}{\partial x^2}+\underset{j}{\rightarrow}\frac{\partial}{\partial y^2}+\underset{k}{\rightarrow}\frac{\partial}{\partial z^2}$
    d. $\underset{\nabla}{\rightarrow}=\frac{\partial}{\partial x^2}+\frac{\partial}{\partial y^2}+\frac{\partial}{\partial z^2}$
26. The mathematical operation of a gradient on a physical quantity gives the
    a. Derivative of the quantity
    b. Directional derivative of the physical quantity in space
    c. Derivative of the physical quantity in direction
    d. Derivative of the physical quantity $\underset{\nabla}{\rightarrow}=\underset{i}{\rightarrow}\frac{\partial}{\partial x}+\underset{j}{\rightarrow}\frac{\partial}{\partial y}+\underset{k}{\rightarrow}\frac{\partial}{\partial z}$
27. The divergence of a physical field vector gives
    a. The flow of a fluid from the source to the sink.
    b. Gain or loss of a fluid per unit volume per unit time in a given parallelepiped
    c. The directional derivative of the physical quantity
    d. The vector perpendicular to the surface given by the surface.
28. The curl of a physical field vector gives
    a. Directional properties
    b. Derivative properties
    c. Diverging properties
    d. Rotational properties
29. Maxwell's equations gives
    a. The variation of the electric and magnetic fields in the classical domain
    b. The variation of the electric and magnetic fields in the quantum domain
    c. The unified approach called electromagnetic theory explaining the variation of the static and time varying electric and magnetic fields
    d. The variation of only the electric fields
30. Ampere's circuit law is valid for
    a. Varying current only
    b. Steady current only
    c. Alternative current only
    d. None of these
31. The induced e.m.f in a conductor is …….
    a) Inversely proportional to the rate of change of flux

b) Directly proportional to the total flux associated with the conductor
c) Directly proportional to the rate of change of flux
d) None of the above

32. The lines of force due to a point charge are
(a) Always straight
(b) Always curved
(c) Sometimes curved
(d) None of the above

33. The direction of electric field due to positive charge is .
(a) Away from the charge
(b) Towards the charge
(c) Both (a) and (b)
(d) None of the above

34. A capacitor stores 0.24 coulombs at 10 volts. Its capacitance is
(a) 0.024 F
(b) 0.12 F
(c) 0.6 F
(d) 0.8 F

35. "The total electric flux through any closed surface surrounding charges is equal to the amount of charge enclosed".The above statement is associated with
(a) Coulomb's square law
(b) Gauss's law
(c) Maxwell's second law
(d) Maxwell's third law

36. Electric field intensity is a ____quantity
(a) scalar
(b) Vector
(c) Both (a) and (b)
(d) None of the above

37. The total deficiency or excess of electrons in a body is known as
(a) current
(b) Voltage
(c) Potential gradient
(d) Charge

.

38. _____ Wave is a wave of electric and magnetic field, both varying in space and time and one being the source of other.
a) Electric
b) Magnetic
c) Electromagnetic
d) None

39. _____ modified the Ampere's Law to include displacement current.
    a) Maxwell
    b) Faraday
    c) Ampere
    d) Gauss
40. 'The direction of the induced e.m.f is such that it opposes the change of magnetic flux, which produces it' – is the statement for _____ law.
    a) Maxwell
    b) Faraday
    c) Ampere
    d) Lenz
41. _____ of magnetic field at a place is defined as the magnetic flux per unit area at that place.
    a) Electric current
    b) Magnetic flux
    c) Electric flux
    d) Magnetic induction

42. Force acting on a charge partical due to magnetic field is given by
    a. F = Bq
    b. F = Bv
    c. F = Bqv
    d. $F = Bq^2v$
43. Force acting on a charge particle due to applied electric field is given by
    a. F = qEv
    b. F = qv
    c. F = Ev
    d. F = qE
44. Hall coefficient R is given as
    a. R = ne
    b. $R = n^2e$
    c. $R = ne^2$
    d. R = 1/ne
45. In a Light Emitting Diode, the pn junction is
    a. Forward biased
    b. Reverse biased
    c. Unbiased
    d. Spontaneous
46. In nematic type of displays, the molecules are
    a. Parallel arranged
    b. Perpendicular arranged

c. Randomly arranged
d. crystallite plane like arrangement

47. In cholesteric type of displays, the molecules are
    a. Parallel arranged
    b. Perpendicular arranged
    c. Randomly arranged
    d. crystallite plane like arrangement
48. when the applied voltage is minimum molecules, LCD cell twist the light through its path to …….^{0} at the other end
    a. 0^0
    b. 90^0
    c. 180^0
    d. 360^0
49. when the applied voltage is maximum molecules, LCD cell twist the light through its path to …….^{0} at the other end
    a. 0^0
    b. 90^0
    c. 180^0
    d. 360^0
50. In a Photo Diode, the pn junction is
    a. Forward biased
    b. Reverse biased
    c. Unbiased
    d. Spontaneous

1. A
2. C
3. B
4. D
5. B
6. A
7. B
8. B
9. A
10. B
11. A
12. B
13. A
14. B
15. C
16. D
17. B
18. A

19. C
20. B
21. A
22. D
23. A
24. A
25. A
26. C
27. B
28. D
29. C
30. B
31. C
32. A
33. A
34. A
35. B
36. B
37. D
38. C
39. A
40. D
41. D
42. c
43. d
44. d
45. a
46. a
47. d
48. b
49. a
50. b