

BSNL PLACEMENT PAPER

1. Which of the following pairs does-not match?

- (A) Dielectric strength of air 3 to 5 kV/mm**
- (B) Vacuum may be used for reflective insulation of liquid O₂ tank**
- (C) Permissible water content in transformer oil is 50 ppm**
- (D) Carbon-pile resistors for insulation of oil-filled cables**

(Ans) D

2. Memory of a computer can be increased by

- (A) Increasing the magnetic bubble diameter**
- (B) Decreasing the magnetic bubble diameter**
- (C) Using adomax, a recent hard magnetic material**
- (D) Using strontium titanate (SrTiO₃)**

(Ans) B

3. The residual magnetic flux density is more in

- (A) Metallic magnets**
- (B) Ceramic magnets**
- (C) Graphite**
- (D) Iron oxide**

(Ans) A

4. Manganese ferrites is a 1:1 mixture of

- (A) MnO and CdO**
- (B) MnO and Fe₂O₃**
- (C) MnCl₂ and Fe₂O₃**
- (D) MnCl₂ and CdO**

(Ans) B

5. High frequency transformer cores are generally made of

- (A) Cast iron**
- (B) Mumetal**
- (C) Ferrite**
- (D) Graphite**

(Ans) C

6. For high speed reading and storing of information in a computer, the use is made of

- (A) Ferrite**
- (B) Piezoelectric**
- (C) Pyro electrics**
- (D) Ferromagnetism above 768° C**

(Ans) A

7. The poles of alternators are usually made of

- (A) Wrought iron**
- (B) permalloy**
- (C) CdS**
- (D) Alnico**

(Ans) B

8. In a semiconductor strain gauge, the change in resistance on application of strain is mainly due to the change in its

- (A) Length**
- (B) Diameter**
- (C) Resistivity**
- (D) Length and diameter**

(Ans) D

9. Transformer oil is a liquid insulator and is mainly used in transformer. It is filled into transformer tank to serve the following purposes:

I. To transfer the heat generated inside the transformer core and windings, to the outer cooling surfaces.

II. To main insulation in the primary and secondary windings.

(A) Only I is correct

(B) Only II is correct

(C) Both I and II are correct

(D) None of these

(Ans) C

10. Electrons in an atom may be visualized by

(A) Spectroscopic techniques

(B) Radiography

(C) Optical microscope

(D) Etching techniques

(Ans) A

11. Most malleable metal is

(A) Au

(B) Ag

(C) Cr

(D) Osmium

(Ans) B

12. As the temperature of a *p*-type semi-conductor is gradually and continuously increased, the fermi level will move

(A) Into the valence band

(B) Into the conduction band

(C) Towards the middle of the forbidden gap

(D) Into the region between the acceptor level and the valence band

(Ans) A

13. Which one of the following polarization mechanisms/sets of mechanisms contribute to the static dielectric constant of a homopolar neutral dielectric?

(A) Electronic

(B) Electronic and ionic

(C) Electronic, ionic and dipolar

(D) Electric and dipolar

(Ans) D

14. Consider the following materials:

1. Pure silica

2. Bakelite

3. Hard rubber

4. Paraffin

The correct sequence of the DECREASING order of loss angles (60 Hz) of these dielectric materials is

(A) 1,2,3,4

(B) 1,4,3,2

(C) 4,1,2,3

(D) 4,3,1,2

(Ans) D

15. Which one of the following materials is piezoelectric?

(A) Pb_2Au

(B) $BaTiO_3$

(C) MgAl_2O_4

(D) NiFe_2O_4

(Ans) B

16. The residual resistivity of metals

(A) is essentially independent of temperature

(B) Increases linearly with increasing temperature

(C) Decrease linearly with increasing temperature

(D) Initially increase linearly with temperature and then remains constant

(Ans) B

17. Consider the following metals:

1. Zinc

2. Gold

3. Silver

4. Copper

The correct sequence of the increasing order of their resistivities is

(A) 4,3,1,2

(B) 3,4,2,1

(C) 4,3,2,1

(D) 3,4,1,2

(Ans) B

18. A type-I super-conductor maintained at a temperature $T < T_c$ is subject to a magnetic field $H < H_c$. The superconductor will exhibit.

(A) Perfect diamagnetism

(B) Partial diamagnetism

(C) Perfect paramagnetism

(D) Partial paramagnetism

(Ans) A

19. The magnetic susceptibility of a paramagnetic material is

- (A) less than zero**
- (B) Less than one but positive**
- (C) Greater than one**
- (D) Equal to zero**

(Ans) B

20. Magnetostriction is a phenomenon whereby the magnetisation of a ferromagnetic material leads to a change in

- (A) Relative permeability**
- (B) Physical dimensions**
- (C) Spontaneous magnetisation**
- (D) Magnetic susceptibility**

(Ans) B

21. Two initially identical samples *A* and *B* of pure germanium are doped with donors to concentrations of $1 \times 10^{20} \text{ m}^{-3}$ and $3 \times 10^{20} \text{ m}^{-3}$ respectively. If the hole concentration in *A* is $9 \times 10^{12} \text{ m}^{-3}$, then the hole concentration in *B* at the same temperature will be

- (A) $3 \times 10^{12} \text{ m}^{-3}$**
- (B) $7 \times 10^{12} \text{ m}^{-3}$**
- (C) $11 \times 10^{12} \text{ m}^{-3}$**
- (D) $27 \times 10^{12} \text{ m}^{-3}$**

(Ans) A

22. Consider the following statements: Pure germanium and pure silicon are examples of

- 1. Direct band-gap semi-conductors**
- 2. Indirect band-gap semi-conductors**

3. Degenerate semi-conductors

of these statements

(A) 1 alone is correct

(B) 2 alone is correct

(C) 3 alone is correct

(D) 1 and 3 are correct

(Ans) B

23. Consider the following statements: In a semi-conductor, the measurement of Hall coefficient provides quantitative information on

1. Density of carriers

2. Polarity of carriers

3. Effective mass of the carriers

4. Mobility of the carriers

Of these statements:

(A) 1 and 2 are correct (Ans)

(B) 2 and 3 are correct

(C) 1 and 3 are correct

(D) 1, 2, 3 and 4 are correct

(Ans) A

24. Silicon carbide reinforced aluminium metal matrix composites find application in

(A) The manufacture of transformer cores

(B) The manufacture of cutting tools

(C) The manufacture of standard resistors

(D) Aerospace industry

(Ans) D

25. GaAs LEDs emit radiation in the

- (A) Ultraviolet region**
- (B) violet-blue-green range of the visible region**
- (C) Visible region**
- (D) infra-red region**

(Ans) D

26. There are basic crystal systems

- (A) two**
- (B) Four**
- (C) six**
- (D) seven**

(Ans) D

27. A suitable material for VHF (Very high frequency) application is

- (A) Silicon steel**
- (B) Alnico**
- (C) Cobalt steel**
- (D) Ferrite**

(Ans) A

28. Heating in microwave oven is due to

- (A) Magnetostriction**
- (B) Electrostriction**
- (C) Eddy current**
- (D) Spontaneous polarization**

(Ans) C

29. Line insulators are made of

(A) Porcelain

(B) Mica

(C) Marble

(D) PVC

(Ans) A

30. Insulating materials that can withstand a temperature above 180° C is of

(A) Class A type

(B) Class B type

(C) Class C type

(D) Class H type

(Ans) C

31. Displacement current in a dielectric primarily depends upon the

(A) Resistivity

(B) Dipole moment

(C) Frequency of operating field

(D) Mobility

(Ans) B

32. In an imperfection free crystal, the resistivity will be

(A) infinite

(B) Zero

(C) Negative

(D) Unity

(Ans) B

33. A metallic bond is formed from

- (A) Sharing of electrons
- (B) Transfer of electrons
- (C) Sharing of variable number of electrons by a variable number of atoms
- (D) None of these

(Ans) C

34. The work function (W) is given by the relation :

(A) $W = h^2f_0$

(B) $W = hf_0$

(C) $W = hf_0^2$

(D) $W = h^2f_0^2$

(Ans) B

35. Einstein's photoelectric equation is given by

(A) $hf = W^2 + 1/2 mv^2$

(B) $hf = W + 1/2 m^2v^2$

(C) $hf = W + 1/2 mv^2$

(D) $hf = W^2 + 1/2 m^2v^2$

(Ans) C

36. X-rays were discovered accidentally by Professor Rontgen in

(A) 1870

(B) 1885

(C) 1895

(D) 1900

(Ans) C

37. Bragg's law is given by the equation

(A) $2d^2 \sin \theta = n\lambda$

(B) $2d \sin^2 \theta = n\lambda$

(C) $2d \sin \theta = n\lambda$

(D) $2d^2 \sin \theta = n\lambda^2$

(Ans) C

38. In some applications neutron diffraction is much to X-rays and electron diffraction

(A) inferior

(B) Superior

(C) Either of the above

(D) None of these

(Ans) B

39. The coordination number is twelve for a

(A) H.C.P. structure

(B) F.C.C. structure

(C) S.C. and F.C.C. structure

(D) H.C.P. and F.C.C. structure

(Ans) D

40. The quantity $1/\sqrt{\mu_0 \epsilon_0}$ in SI units has the

(A) Value 330 m/s

(B) Value 1.73×10^4

(C) Dimensions LT^{-1}

(D) None of the above

(Ans) C

41. Which of the following does not have the same units as the others? The symbols have their usual meanings

- (A) L/R
- (B) RC
- (C) \sqrt{LC}
- (D) $1/\sqrt{LC}$

(Ans) D

42. *n*-type semiconductors

- (A) Are negatively charged
- (B) Are produced when indium is added as an impurity to germanium
- (C) Are produced when phosphorous is added as an impurity to silicon
- (D) None of these

(Ans) C

43. Which of the following statements correct?

- (A) Copper has partially filled conduction band
- (B) Diamond has a completely filled conduction band but an empty valence band
- (C) Silicon has a partially filled conduction band and an empty valence band
- (D) Energy gap between conduction and valence band in diamond is smaller than in silicon

(Ans) A

44. Which of the following will serve as a donor impurity in silicon?

- (A) Boron
- (B) Indium
- (C) Germanium
- (D) Antimony

(Ans) D

45. Two-closed packed crystal structures are

(A) *bcc* and *fcc*

(B) *fcc* and *hcp*

(C) *bcc* and *hcp*

(D) *fcc* and *sc*

(Ans) B

46. The mean free path for electron drift increase with

(A) Purity

(B) Strain hardening

(C) Elastic modulus

(D) None of the above

(Ans) A

47. Two group IV elements have the same diamond cubic structure. The one with the larger is expected to have the smaller energy gap.

(A) Packing factor

(B) Co-ordination number

(C) Number of valence electrons

(D) Atomic weight

(Ans) D

48. The processes that can be used to make the steel magnetically softer are

1. Annealing

2. Grain growth

3. Decarburization

4. Quenching

(A) 1, 2 and 3

(B) 2, 3 and 4

(C) 2 and 3 only

(D) 3 and 4 only

(Ans) A

49. Polarization is a measure of

(A) Dielectric constant per unit volume

(B) Voltage gradient of produce electrical breakdown

(C) Product of charge and distance

(D) Excess charge density

(Ans) A

50. Consider the following semi-conductor diodes

1. Germanium diode

2. Silicon diode

3. Tunnel diode

4. Schottky diode

The correct increasing order of forward voltage drop of these diodes is

(A) 1,3,2,4

(B) 1,2,3,4

(C) 3,4,2,1

(D) 3,1,4,2

(Ans) D

