Question Bank

B. Sc. Semester-IV

Physics Paper-II

UNIT-I

1. **In LED's light energy is emitted when_____**
   a. electrons falls from conduction band into holes is valence band
   b. electrons falls from valence band into holes is conduction band
   c. electrons and holes recombine in forbidden energy gap
   d. both 'b' and 'c'

2. **LEDs of GaAs and GaAsP releases energy in_____**
   a. infra-red and visible region respectively
   b. visible and infra-red region respectively
   c. visible and ultra-violet region respectively
   d. ultra-violet and infra-red region respectively

3. **A solar cell is a _____**
   a. P-type semiconductor
   b. N-type semiconductor
   c. Intrinsic semiconductor
   d. P-N Junction

4. **What is the difference between Photodiode and Solar cell?**
   a. No External Bias in Photodiode
   b. No External Bias in Solar cell
   c. Larger surface area in photodiode
   d. No difference

5. **Which of the following are the charge carriers available in BJT?**
   a. Holes
   b. Electrons
   c. Neutrons
   d. Both a and b

6. **A transistor has ……**
   a. one pn junction
   b. two pn junctions
   c. three pn junctions
   d. four pn junctions

7. **A transistor is a …… operated device**
   a. current
   b. voltage

c. both voltage and current
d. none of the above

8. The emitter of a transistor is …… doped
a. lightly
b. heavily
c. moderately
d. none of the above

9. In a transistor, the base current is about …….. of emitter current
a. 25%
b. 20%
c. 35 %
d. 5%

10. In a transistor ……..
a. $I_C = I_E + I_B$
b. $I_B = I_C + I_E$
c. $I_E = I_C – I_B$
d. $I_E = I_C + I_B$

11. $I_C = \alpha I_E$ + ……
a. I_B
b. I_{CEO}
c. I_{CBO}
d. βI_B

12. In a transistor, I_C = 100 mA and I_E = 100.2 mA. The value of β is ……
a. 100
b. 50
c. about 1
d. 200

13. The relation between β and α is ……..
a. $\beta = 1 / (1 – \alpha)$
b. $\beta = (1 – \alpha) / \alpha$
c. $\beta = \alpha / (1 – \alpha)$
d. $\beta = \alpha / (1 + \alpha)$

14. $I_C = [\alpha / (1 – \alpha)] I_B$ + ……
a. I_{CEO}
b. I_{CBO}
c. I_C
d. $(1 – \alpha) I_B$

15. IC = [α / (1 – α)] IB + […….. / (1 – α)]
a. I_{CBO}
b. I_{CEO}
c. I_C

d. I_E

UNIT-II

16. A JFET is similar in operation to ……. valve
a. diode
b. pentode
c. triode
d. tetrode

17. A JFET is also called …… transistor
a. unipolar
b. bipolar
c. unijunction
d. none of the above

18. The gate of a JFET is …… biased
a. reverse
b. forward
c. reverse as well as forward
d. none of the above

19. In a p-channel JFET, the charge carriers are ……..
a. electrons
b. holes
c. both electrons and holes
d. none of the above

20. When drain voltage equals the pinch-off-voltage, then drain current ……. with the increase in drain voltage
a. decreases
b. increases
c. remains constant
d. none of the above

21. If the reverse bias on the gate of a JFET is increased, then width of the conducting channel ……..
a. is decreased
b. is increased
c. remains the same
d. none of the above

22. A MOSFET can be operated with ……..
a. negative gate voltage only
b. positive gate voltage only
c. positive as well as negative gate voltage
d. none of the above

23. A JFET has …….. power gain

a. small
b. very high
c. very small
d. none of the above

24. A JFET has three terminals, namely ……

a. cathode, anode, grid
b. emitter, base, collector
c. source, gate, drain
d. none of the above

25. A JFET is a …… driven device

a. current
b. voltage
c. both current and voltage
d. none of the above

26. The gate of a JFET is …… biased

a. reverse
b. forward
c. reverse as well as forward
d. none of the above

27. In a p-channel JFET, the charge carriers are ……..

a. electrons
b. holes
c. both electrons and holes
d. none of the above

28. The input control parameter of a JFET is ……

a. gate voltage
b. source voltage
c. drain voltage
d. gate current

29. A common base configuration of a pnp transistor is analogous to …… of a JFET

a. common source configuration
b. common drain configuration
c. common gate configuration
d. none of the above

30. What type of MOSFETs preferred for Power electronics?

a. Enhancement
b. Enhancement
c. P-channel Depletion
d. N-channel Depletion

UNIT-III

31. The spectra caused in the infrared region by the transition in vibrational levels in different modes of vibrations are called

a. rotational spectra
b. electronic spectra
c. vibrational spectra
d. none of these

32. The IR spectra of a compound helps in

a. proving the identity of compounds
b. showing the presence of certain functional groups in the molecule
c. neither of the above
d. both of the above

33. The Raman and IR spectra can tell us whether

a. a molecule is linear or non-linear
b. a molecule is symmetrical or asymmetrical
c. neither of the above
d. both of the above

34. Which of the following will show an absorption band at the greatest wavenumber?

a. C=C
b. C≡C
c. C=O
d. C–N

35. The intensity of an absorption band is always proportional to the

a. Atomic population
b. Molecular population of the initial state
c. Molecular population of the final state
d. Temperature

36. The different types of energies associated with a molecule are _____

a. Electronic energy
b. Vibrational energy
c. Rotational energy
d. All of the mentioned

37. During the motion, if the centre of gravity of molecule changes, the molecule possess _____

a. Electronic energy
b. Rotational energy
c. Translational energy
d. Vibrational energy

38. The correct order of different types of energies is _____

a. E >> E >> E >> E
b. E >> E >> E >> E
c. E >> E >> E >> E
d. E >> E >> E >> E

39. Which of the following is an application of molecular spectroscopy?

a. Structural investigation
b. Basis of understanding of colors
c. Study of energetically excited reaction products
d. All of the mentioned

40. Which of the region of IR spectra appears between (1400-600) cm ?

a. Functional group region
b. Fingerprint region
c. Low-frequency region
d. None of the mentioned

41. Helium has _____ atomicity

a. Tetra-atomic
b. Diatomic
c. Poly-atomic
d. Monoatomic

42. Series that lie in the infrared region of electromagnetic spectrum is

a. Lyman series
b. Ballmer series
c. bracket series
d. both a and b

43. According to Bohr's atomic model, the angular momentum of electron in nth orbit is equal to an integral multiple of

a. $2h/\pi$
b. $h/2\pi$
c. h/π
d. $nh/2\pi$

44. Atomic spectra is an example of

a. line spectra
b. continuous spectra
c. band spectra
d. both a and b

45. Which of the following elements has the maximum atomic radius?

a. P
b. Cl
c. Na
d. S

UNIT-IV

46. Raman effect is scattering of _____
a. Atoms
b. Molecules
c. Protons
d. Photons

47. The elastic scattering of photons is called as _____
a. Atmospheric scattering
b. Rayleigh Scattering
c. Conserved Scattering
d. Raman Scattering

48. Which of the following cannot be conserved during Raman scattering?
a. Total Energy
b. Momentum
c. Kinetic Energy
d. Electronic Energy

49. How many degrees of freedom does a chemical compound of N atoms have?
a. 2N
b. 2N + 1
c. 3N
d. 3N + 1
Answer: c

50. In Raman spectroscopy, the radiation lies in the _____
a. Microwave Region
b. Visible Region
c. UV Region
d. X-ray Region

51. Raman lines are _____
a. Weak
b. Strong
c. Curved
d. Blurry

52. The transition zone for Raman spectra is _____
a. Between vibrational and rotational levels
b. Between electronic levels
c. Between magnetic levels of nuclei
d. Between magnetic levels of unpaired electrons

53. Which of the following will NOT show electron spin resonance (ESR)?
a. Free radicals
b. Paramagnetic materials
c. Transition metals
d. Diamagnetic materials

54. Which of the following electromagnetic radiation is used in ESR?

a. IR radiation
b. Radio waves
c. X-radiation
d. Microwaves

55. NMR is the study of absorption of _____ by nuclei in a magnetic field?

a. Radioactive radiation
b. IR radiation
c. Radio frequency radiation
d. Microwaves

56. NMR spectrometer provides _____ and_____ method of determining structure insoluble chemical compounds.

a. Accurate, destructive
b. Accurate, non-destructive
c. Inaccurate, destructive
d. Inaccurate, non-destructive

57. NMR spectroscopy indicates the chemical nature of the_____ and spatial positions of_____

a. Electrons, Protons
b. Neutrons, electrons
c. Nuclei, electrons
d. Nuclei, neighbouring nuclei

58. Interaction between matter and electromagnetic radiation can be observed by subjecting a substance to magnetic fields in which of the following manner?

a. Both fields should be stationary
b. Both fields should be varying
c. One field should be stationary and the other should be varying
d. It must be subjected to only one field

59. Nuclei having either the number of protons or neutrons as odd have _____ spin.

a. Integral spin
b. Half integral spin
c. Zero spin
d. Positive spin

60. What is shielding in NMR?

a. Using a curved piece of metal to block an opponents attack
b. Putting metal around an RF source
c. When the magnetic moment of an atom blocks the full induced magnetic field from surrounding nuclei
d. Blocking parts of a molecule from RF radiation