SUBJECT CODE	SUBJECT	PAPER
A-16-03	PHYSICAL SCIENCES	III

HALL TICKET NUMBER	QUESTION BOOKLET NUMBER

OMR SHEET NUMBER

DURATION	MAXIMUM MARKS	NUMBER OF PAGES	NUMBER OF QUESTIONS
2 HOUR 30 MINUTES	150	16	75

This is to certify that, the entries made in the above portion are correctly written and verified.

Candidates Signature **Name and Signature of Invigilator**

Instructions for the Candidates

1. Write your Hall Ticket Number in the space provided on the top of this page.
2. This paper consists of seventy five multiple-choice type of questions.
3. At the commencement of examination, the question booklet will be given to you. In the first 5 minutes, you are requested **to open the booklet and compulsorily examine it as below** :
   (i) To have access to the Question Booklet, tear off the paper seal on the edge of this cover page. Do not accept a booklet without sticker-seal and do not accept an open booklet.
   (ii) **Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faulty booklets due to pages/questions missing or duplicate or not in serial order or any other discrepancy should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given.**
   (iii) After this verification is over, the Test Booklet Number should be entered in the OMR Sheet and the OMR Sheet Number should be entered on this Test Booklet.
4. Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item.
   Example: (A) (B) ● (D)
   where (C) is the correct response.
5. Your responses to the items are to be indicated in the **OMR Answer Sheet given to you**. If you mark at any place other than in the circle in the Answer Sheet, it will not be evaluated.
6. Read instructions given inside carefully.
7. Rough Work is to be done in the end of this booklet.
8. If you write your name or put any mark on any part of the OMR Answer Sheet, except for the space allotted for the relevant entries, which may disclose your identity, you will render yourself liable to disqualification.
9. **The candidate must handover the OMR Answer Sheet to the invigilators at the end of the examination compulsorily** and must not carry it with you outside the Examination Hall. The candidate is allowed to take away the carbon copy of OMR Sheet and used Question paper booklet at the end of the examination.
10. **Use only Blue/Black Ball point pen.**
11. **Use of any calculator or log table etc., is prohibited.**
12. **There is no negative marks for incorrect answers.**

అభ్యర్థులకు సూచనలు

1. ఈ పుట పై భాగంలో ఇవ్వబడిన స్థలంలో మీ హాల్ టికెట్ నంబరు రాయండి.
2. ఈ ప్రశ్న పత్రము డెభైఐదు బహుళైచ్ఛిక ప్రశ్నలను కలిగి ఉంది.
3. పరీక్ష ప్రారంభమున ఈ ప్రశ్నాపత్రము మీకు ఇవ్వబడుతుంది. మొదటి ఐదు నిమిషములలో **ఈ ప్రశ్నాపత్రమును తెరిచి కింద తెలిపిన అంశాలను తప్పనిసరిగా సరిచూసుకోండి.**
   (i) ఈ ప్రశ్న పత్రమును చూడడానికి కవర్‌పేజి అంచున ఉన్న కాగితపు సీలును చించండి. స్టిక్కర్ సీలులేని మరియు ఇదివరకే తెరిచి ఉన్న ప్రశ్నాపత్రమును మీరు అంగీకరించవద్దు.
   (ii) **కవరు పేజి పై ముద్రించిన సమాచారం ప్రకారం ఈ ప్రశ్నపత్రములోని పేజీల సంఖ్యను మరియు ప్రశ్నల సంఖ్యను సరిచూసుకోండి. పేజీల సంఖ్యకు సంబంధించి గానీ లేదా సూచించిన సంఖ్యలో ప్రశ్నలు లేకపోవుట లేదా నిజప్రతి కాకపోవుట లేదా ప్రశ్నలు క్రమపద్ధతిలో లేకపోవుట లేదా ఏవైనా తేడాలుండుట వంటి దోషపూరితమైన ప్రశ్న పత్రాన్ని వెంటనే మొదటి ఐదు నిమిషాల్లో పరీక్షా పర్యవేక్షకునికి తిరిగి ఇచ్చివేసి దానికి బదులుగా సరిగ్గా ఉన్న ప్రశ్నపత్రాన్ని తీసుకోండి. తదనంతరం ప్రశ్నపత్రము మార్చబడదు అదనపు సమయం ఇవ్వబడదు.**
   (iii) పై విధంగా సరిచూసుకొన్న తర్వాత ప్రశ్నాపత్రం సంఖ్యను OMR పత్రము పై అదేవిధంగా OMR పత్రము సంఖ్యను ఈ ప్రశ్నాపత్రము పై నిర్దిష్టస్థలంలో రాయవలెను.
4. ప్రతి ప్రశ్నకు నాలుగు ప్రత్యామ్నాయ ప్రతిస్పందనలు (A), (B), (C) మరియు (D) లుగా ఇవ్వబడ్డాయి. ప్రతిప్రశ్నకు సరైన ప్రతిస్పందనను ఎన్నుకొని కింద తెలిపిన విధంగా OMR పత్రములో ప్రతి ప్రశ్నా సంఖ్యకు ఇవ్వబడిన నాలుగు వృత్తాల్లో సరైన ప్రతిస్పందనను సూచించే వృత్తాన్ని బాల్ పాయింట్ పెన్‌తో కింద తెలిపిన విధంగా పూరించాలి.
   ఉదాహరణ : (A) (B) ● (D)
   (C) సరైన ప్రతిస్పందన అయితే
5. ప్రశ్నలకు ప్రతిస్పందనలను ఈ ప్రశ్నపత్రముతో ఇవ్వబడిన OMR పత్రము పైన ఇవ్వబడిన వృత్తాల్లోనే పూరించి గుర్తించాలి. అలాకాక సమాధాన పత్రంపై వేరొక చోట గుర్తిస్తే మీ ప్రతిస్పందన మూల్యాంకనం చేయబడదు.
6. ప్రశ్న పత్రము లోపల ఇచ్చిన సూచనలను జాగ్రత్తగా చదవండి.
7. చిత్తుపనిని ప్రశ్నపత్రము చివర ఇచ్చిన ఖాళీస్థలములో చేయాలి.
8. OMR పత్రము పై నిర్ణీత స్థలంలో సూచించవలసిన వివరాలు తప్పించి ఇతర స్థలంలో మీ గుర్తింపును తెలిపే విధంగా మీ పేరు రాయడం గానీ లేదా ఇతర చిహ్నాలను పెట్టడం గానీ చేసినట్లయితే మీ అనర్హతకు మీరే బాధ్యులవుతారు.
9. **పరీక్ష పూర్తయిన తర్వాత మీ OMR పత్రాన్ని తప్పనిసరిగా పరీక్ష పర్యవేక్షకుడికి ఇవ్వాలి.** వాటిని పరీక్ష గది బయటకు తీసుకువెళ్లకూడదు. పరీక్ష పూర్తయిన తరువాత అభ్యర్థులు ప్రశ్న పత్రాన్ని, OMR పత్రం యొక్క కార్బన్ కాపీని తీసుకువెళ్లవచ్చు.
10. **నీలి/నల్ల రంగు బాల్ పాయింట్ పెన్ మాత్రమే ఉపయోగించాలి.**
11. **లాగరిథమ్ టేబుల్స్, క్యాలిక్యులేటర్‌లు, ఎలక్ట్రానిక్ పరికరాలు మొదలగునవి పరీక్షగదిలో ఉపయోగించడం నిషేధం.**
12. **తప్పు సమాధానాలకు మార్కుల తగ్గింపు లేదు.**

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PHYSICAL SCIENCES

Paper – III

1. Which one of the following methods is best applicable for solving boundary value problems of partial differential equations ?

(A) Laplace Transform

(B) Fourier Transform

(C) Z transforms

(D) Greens functions

2. Match the following :

I. Heat equation	1. parabolic
II. Harmonic equation	2. elliptic
III. Wave equation	3. Hyperbolic

	I	II	III
(A)	1	3	2
(B)	1	2	3
(C)	2	1	3
(D)	3	2	1

3. The fundamental Green's function for 2 dimensional Laplace equation is

(A) $\frac{1}{2}|x_1 - x_2|$

(B) $\frac{1}{2\pi} ln|r_1 - r_2|$

(C) $-\frac{1}{4\pi|r_1 - r_2|}$

(D) $e^{|x1-x2|}$

4. If $f(x) = x^3 - x - 1 = 0$, starting from $x_0 = 1$, the iterative scheme that converges is x =

(A) $x^3 - 1$

(B) $(1 + x)/x^2$

(C) $(1 + x)^{1/3}$

(D) $1/(x^2 - 1)$

5. If $f(x) = x^3 - 4x - 9$,then f (x) = 0 has a root in the interval

(A) [– 1, 0]

(B) [0, 1]

(C) [1, 2]

(D) [2, 3]

6. The Lagrangian shape function for the points x = 0, 1, 2 at x = 0 is given by

(A) ½ (x – 1)(x – 2)

(B) ½ x(x– 1)

(C) ½ x(x – 2)

(D) ½ (x + 1) (x + 2)

7. Choose the correct answer :

I : The particles like π mesons, α particles of spin – 0 are described by vectors

II : The particles like deuterons of spin – 1 are described by scalars.

(A) I and II are true

(B) I is true, II is false

(C) I is false, II is true

(D) I and II are false

8. In Cartesian frame, metric tensor reduces to

(A) kronecker delta

(B) permutation tensor

(C) scalar

(D) vector

9. Order of SU(n) =

(A) $n^2 - 1$

(B) $n(n-1)/2$

(C) $\frac{1}{2} n^2$

(D) $n(n+2)/6$

10. The space represented by generalized coordinates and generalized momenta is called

(A) Configuration space

(B) Phase space

(C) Einstein space

(D) Minkowski space

11. If η is a canonical variable vector, then $[\eta, \eta]_{\eta} =$

(A) – J

(B) 0

(C) I

(D) J

12. If u is constant of motion, then [H, u]=

(A) 0

(B) $\partial H/\partial t$

(C) $\partial u/\partial t$

(D) $\partial H/\partial u$

13. (Poisson theorem) The Poisson bracket of any two constants of motion is

(A) constant of motion

(B) independent of time

(C) independent of coordinates

(D) independent of momenta

14. If $H = p^2/2m - amx$, then [x, H] =

(A) mp

(B) x

(C) p/m

(D) – am

15. Which of the following is wrong ?

(A) $[f, L] = -I \times f$

(B) $[f_i, L_j] = \varepsilon_{ijk} f_k$

(C) $[f_i, L_j] = -f_k$, where i,j,k are cyclic

(D) $[f_i, L_j] = f_k$, where i,j,k are cyclic

16. The solution of Hamilton-Jacobi equation is called _____ function.

(A) Jacobi

(B) Hamilton principal

(C) Hamilton-Jacobi

(D) Jacobi conservation

17. $\int_{t_0}^{t_1} L dt$ is called _____ integral.

(A) Action

(B) Hamiltonian-Lagrangian

(C) Jacobi

(D) Work force path

18. If kinetic energy quadratic is in q_i', then $\Sigma p_i q_i' =$

(A) 2T

(B) L

(C) H

(D) 2J

19. The radiation resistance of an omnidirectional antenna having a field pattern given by $E = (10 I / r)$ (V/m) [where I = terminal current and r = distance (m)]

(A) 3.33 Ω

(B) 33.3 Ω

(C) 333 Ω

(D) 1 Ω

20. The directivity of a broad side array of two $\lambda/2$ dipoles is

(A) 1.64

(B) 1.56

(C) 4

(D) 6

21. Choose the correct answer from the following statements.

If a dipole has between cut from a metal sheet, leaving a slot, then

I) The dipole and slot are said to be complementary

II) The field pattern of dipole and slot are the same but with E and H interchanged

III) The slot impedance is inversely proportional to dipole admittance

(A) I) and II) are correct

(B) II) and III) are correct

(C) III) and I) are correct

(D) All are correct

22. The cut-off wavelengths for the dominant mode in the case of rectangular wave guide of dimensions 45 × 90 mm without and filled with dielectric of relative permittivity 1.7 are respectively

(A) 235 mm, 180 mm

(B) 90 mm, 235 mm

(C) 180 mm, 235 mm

(D) 235 mm, 90 mm

23. In the Cauchy's formula for refractive index given by $n = 1 + A(1 + B/\lambda^2)$, A and B are respectively

(A) Coefficient of refraction and co-efficient of reflection

(B) Coefficient of refraction and co-efficient of absorption

(C) Coefficient of absorption and co-efficient of transmission

(D) Coefficient of absorption and co-efficient of reflection

24. Assuming azimuthal symmetry, the relation between the scattering amplitude and the differential cross-section $(d\sigma/d(\Omega) =$

(A) $|f_k(\theta)|$

(B) $|f_k(\theta)|^2$

(C) $f_k(\theta)$

(D) $|f_k(\theta)|^3$

25. If $\overline{A}$ is a vector potential and Φ is a scalar potential, for solving problems dealing with radiation, the coulomb gauss employs

(A) $\nabla . \overline{A} = 0, \ \Phi = 0$

(B) $\nabla . \overline{A} = \Phi$

(C) $\nabla \times \overline{A} = \Phi$

(D) $\nabla \times \overline{A} = 0, \ \Phi =$ Constant

26. If the depth of penetration of EM wave in a medium having conductivity σ at a frequency of 1 MHz is 25 cm, then the depth of penetration at a frequency 16 MHz will be

(A) 6.25 cm

(B) 12.5 cm

(C) 25 cm

(D) 100 cm

27. The value of fine structure constant is

(A) 1

(B) 137

(C) 1/137

(D) $(1/137)^2$

28. The total angular momentum J =

(A) L + S

(B) L – S

(C) 2(L + S)

(D) None

29. Choose the correct answer from the following statements :

I) Spin- orbit interaction is weak in one electron atoms but strong in multi-electron atoms

II) Coulomb interaction between Nucleus and electron cannot explain fine structure in atomic spectra

(A) I) only is correct

(B) II) only is correct

(C) Both are correct

(D) Both are wrong

30. According to Langevin's classical diamagnetic theory, when external magnetic field is applied on a revolving electron in the atom

(A) The magnetic flux linked with the revolving electron do not have interaction with the applied field

(B) The magnetic flux generated with the revolving electron interacts with the applied field without affecting the orbital current

(C) The magnetic flux linked with the orbital electronic current loop changes the current such that it opposes the change in flux

(D) The magnetic flux linked with the orbital electronic current loop changes the current such that magnetic field and flux due to revolving electron current point in the same direction

31. The paramagnetic materials have

(A) Small magnetic susceptibility with temperature independence

(B) Large magnetic susceptibility

(C) Small magnetic susceptibility with temperature dependence

(D) Ability to rotate atomic magnetic moments in the same direction at room temperature

32. In thermodynamics, in case of phase transitions of first order, first order derivatives of Gibbs function undergo

(A) Continuous changes

(B) Negligibly small changes

(C) Finite changes

(D) Step like changes after some increase of parameters

33. In thermodynamics, in case of phase transitions of second order type materials at transition temperature

(A) Undergo volume change at constant temperature and pressure

(B) Undergo entropy change at constant temperature and pressure

(C) First order derivatives of Gibbs function exhibit discontinuity

(D) Second order derivatives of Gibbs function undergo finite changes

34. In ferromagnetic materials

(A) Each atom has net electronic spin

(B) There is no coordination among neighbouring atoms in a domain

(C) Below critical temperature, it shows paramagnetic phase

(D) Above critical temperature it exhibits large hysteresis curve area

35. In typical ferromagnetic material of a few cm^3 volume

(A) It has single domain

(B) If the temperature is more than critical temperature all the domains orient their magnetic moments parallel to each other

(C) If the temperature is more than critical temperature, all the atoms in the material rotate their magnetic moments in a random direction

(D) When high external magnetic field is applied on the material all the domains try to rotate their magnetic moments opposite to the field direction

36. According to Brownian motion

(A) It is the systematic motion of small particles in straight lines through fluid media

(B) Brownian motion theory can be used for systematic moving of macro vehicles on the roads

(C) According to Einstein, pollen grains in water medium were moved by individual water molecules

(D) The direction of force of atomic bombardment on particles in a fluid is always along a straight line there by making particles to move in straight lines

37. According to Bose – Einstein condensate

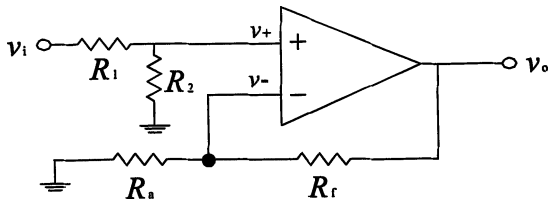
(A) It is a state of matter of concentrated gas bosons heated to very high temperatures

(B) At very low temperatures near about 0 K a large fraction of Bosons occupy the lowest quantum state where macroscopic quantum phenomena become apparent

(C) He-4 can be realised at room temperature

(D) He-4 exhibits very high viscosity

38. The output V_o of the Op-Amp circuit given below when all the resistors are equal to R is



(A) $2\ V_{in}$

(B) V_{in}

(C) $-V_{in}$

(D) $-2\ V_{in}$

39. Find the change in the wire resistance for a strain gauge that has a nominal wire resistance of 100Ω when it is subjected to a strain of 1000 μm/m.

(A) 1Ω

(B) 0.1Ω

(C) 0.2Ω

(D) 0.02Ω

40. A specific gravity of a six cell Lead-acid battery is measured as 1.22. The no-load voltage of the battery is

(A) 2.06 V

(B) 7.32 V

(C) 12.26 V

(D) 5.04 V

41. Germanium has a band gap of 1.072×10^{-19} Joules. The maximum wavelength (in μm) for resistance change by photon absorption so as to use it as a photo detector is

(A) 1.86

(B) 18.6

(C) 1.24

(D) 12.4

42. Relative permittivity can be measured by

(A) Wheatstone's Bridge

(B) Hay's Bridge

(C) Desauty's Bridge

(D) Schering's Bridge

43. Working principle of Radiation Pyrometer is based on

(A) Kirchoff's Law

(B) Stephan-Boltzman's Law

(C) Wien's Law

(D) Sebeck Effect

44. Thermistor is a

(A) Insulator

(B) Conductor

(C) Semiconductor

(D) Capacitor

45. Which of the following is an undesirable dynamic characteristic of a measuring instrument ?

(A) Reproducibility

(B) Dead Zone

(C) Time Lag

(D) Static Error

46. Flapper nozzle is used in

(A) Electronic Controller

(B) Pneumatic Controller

(C) Hydraulic Controller

(D) None

47. Which of the following relates the EMF generated in a single homogeneous wire to temperature difference ?

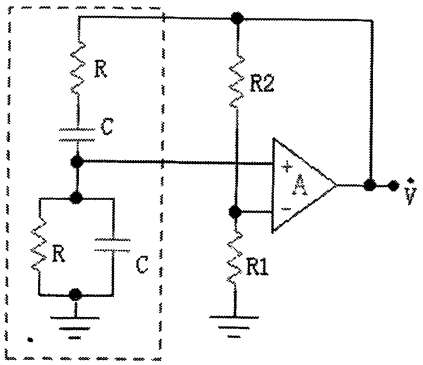
(A) Peltier Effect

(B) Thomson Effect

(C) Sebeck Effect

(D) None of these

48. The shape of the wave generated by the circuit given below at the point V is



(A) Square

(B) Triangular

(C) Sine

(D) Ramp

49. The radius of a hydrogen atom in its ground state is ($h = 6.624 \times 10^{-34}$ Js, $\in_0 = 8.85 \times 10^{-12} cNm^{-2}$, $m_e = 9.11 \times 10^{-31}$ Kg)

(A) 2×10^{-9} m

(B) 4×10^{-8} m

(C) 52.9×10^{-12} m

(D) 16.16×10^{-9} m

50. Using 60 MHz instrument, the difference in frequency between TMS absorption and a certain proton in a compound was found to be 180 Hz. If 40 MHz instrument is used, the frequency difference between these protons is

(A) 56 Hz

(B) 66 Hz

(C) 120 Hz

(D) 160 Hz

51. Electron spin resonance is a spectroscopic technique. One of the basic requirement of x-band spectrometer is

(A) An electromagnet capable of supplying a fixed strength of magnetic field

(B) Source of microwave radiation in the region of 9.5 GHz

(C) Detection system to measure the variation in electromagnetic power in X-ray frequency region

(D) Arrangements for stopping the radiation energy into the sample cavity

52. Electron spin resonance is observed for atomic hydrogen with an instrument operating at 9.5 GHz. If the 'g' value for the electron in the hydrogen atom is 2.0026. The applied magnetic field strength (if $\mu_B = 9.274 \times 10^{-24} JT^{-1}$) is

(A) 0.339 T

(B) 0.94 T

(C) 1.0 T

(D) 4.0 T

53. Raman lines show the following characteristics

(A) They are unsymmetrically displaced about the parent lines

(B) The intensity of stokes lines is always greater compared to anti-stokes lines

(C) They arise due to absorption of light without scattering by vibrating molecule

(D) They do not depend on the polarizability of the bonds in the sample

54. The mean time between atomic collisions depends on

(A) Average speed of the atoms in the gas

(B) Mean free-path

(C) Pressure and temperature of the gas

(D) All the above factors

55. For a cavity consisting of two plane mirrors separated by a distance 60 cm in air, the mode number corresponding to the wavelength 600 nm is

(A) 3×10^6

(B) 1.5×10^6

(C) 2×10^6

(D) 4×10^6

56. The half width of the gain profile of a laser material is 2×10^{-3} nm. If the length of the cavity is 30 cm, the longitudinal modes that can be excited is (the emission wavelength of laser is 600 nm)

(A) 2

(B) 3

(C) 4

(D) 5

57. Match the following :

I. Relative density of FCC	1. 0.52
II. Relative density of BCC	2. 0.74
III. Relative density of SC	3. 0.68
IV. Nuclear structure evaluation	4. NMR study

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

58. Match the following :

Crystal system	**Material with this structure**
I. Tetragonal	1. $K_2Cr_2O_{7,}$ $CuSO_4$
II. Ortho-Rhombic	2. $CaSO_4 . 2H_2O$
III. Monoclinic	3. $PbCO_3$, $BaSO_4$
IV. Triclinic	4. TiO_2, SnO_2

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

59. Using the Fermi function find the temperature at which there is 1% probability that an electron in a solid will have an energy 0.5 eV above E_f of 5 eV, given $\log_e 99 = 4.595$

(A) 300 K

(B) 400 K

(C) 836 K

(D) 1260 K

60. Metals exhibit positive temperature coefficient of resistance due to

(A) Increase of charge carriers density with increase of temperature

(B) Vibrational amplitude of atoms decreases with increase of temperature

(C) Decrease of electronic mean free path with rise of temperature

(D) Increase of collision time between successive collisions between electrons and lattice.

61. In case of reciprocal lattice of a solid

(A) Each point in a reciprocal lattice corresponds to a particular set of parallel planes of the direct lattice

(B) The distance of a reciprocal lattice point from an arbitrarily fixed origin in directly proportional to the interplanar spacing of the corresponding parallel planes of the direct lattice

(C) The volume of the unit cell of the reciprocal lattice is directly proportional to the volume of the corresponding unit cell of the direct lattice

(D) Reciprocal lattice of direct f.c.c lattice is again a reciprocal lattice

62. Match the ratios of $(h^2 + k^2 + l^2)$ successive values for allowed reflections from cubic crystals as obtained from extinction rules.

I. SC	1. 3:8:11:16:19
II. BCC	2. 3:4:8:11:12:16
III. FCC	3. 1:2:3:4:5:6:8
IV. DC	4. 1:2:3:4:5:6:7

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

63. Match the following :

Superconductor	**Type ; Transition Temperature**
I. Pb	1. Type II ; 108 K
II. $YBa_2Cu_3O_7$	2. Type II ; 90 K
III. Nb_3Ge	3. Type II ; 23 K
IV. Bi cuprates	4. Type I ; 6.2 K

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

64. Liquid crystals

(A) Exhibit solid crystal property, when they are at high temperatures

(B) Exhibit liquid property at low temperatures

(C) Exhibit some of the optical properties of their solid form even in the semiliquid state in certain range of temperatures

(D) Are semiconductor materials

65. A G.M. counter records 4,900 background counts in 100 min. With a radioactive source in position, the same total number of counts are recorded in 20 min. The percentage of S.D. with net counts due to the source is

(A) 18

(B) 8

(C) 1.8

(D) 12

66. The half value thickness for β-absorption (E_{max} = 1.17 MeV) in Al is given by

(A) 0.14 Cm

(B) 0.014 Cm

(C) 17.85 Cm

(D) 0.5 Cm

67. The time required for 10% of the sample of Thorium to dissintegrate, given that its half life is 1.4×10^{10} years.

(A) 2.1×10^{9} Years

(B) 1.2×10^{9} Years

(C) 4.7×10^{9} Years

(D) 11,800 Years

68. A proton with total energy 1.4 GeV traverses two scintillation counters 20 m apart. Its time of flight is

(A) 44.9 ns

(B) 83.8 ns

(C) 89.8 ns

(D) 94.4 ns

69. Alpha Decay is a nuclear process occurring under

(A) Electromagnetic Interaction

(B) Strong Interaction

(C) Weak Interaction

(D) None of the above

70. Choose the correct statement from the following :

I) In the neutrino, the spin and angular momentum vectors are oppositely directed.

II) In the anti neutrino, the spin and angular momentum vectors are aligned together.

(A) I only is correct

(B) II only is correct

(C) Both are correct

(D) Both are wrong

71. How many neutrino types are known to exist ?

(A) 2

(B) 4

(C) 8

(D) 6

72. Electron belongs to the class of

(A) Lepton

(B) Fermion

(C) Gravitons

(D) None of the above

73. The precession frequency of a nucleus in the magnetic field of the earth is

(A) 10^{-1} S

(B) 10^{1} S

(C) 10^{3} S

(D) 10^{5} S

74. In a certain betatron, the maximum magnetic field was 4000 Gauss, operating at 50 cycles/Sec with a stable orbit diameter of 60 inches. The average energy gained per revolution is closely

(A) 30 eV

(B) 30 KeV

(C) 30 MeV

(D) None of these

75. Nuclear magnetic resonance involves

(A) A strong magnetic field causing energies of certain nuclei to be split into two or more quantised levels

(B) Energy differences between magnetic quantum levels for atomic nuclei correspond to radiation energies in the frequency range of 0.1 to 100 Hz

(C) Spectrum that results from the transition of electron of the atom from the higher energy state to lower energy state

(D) NMR spectra that cannot give information about electronic environment of a nucleus in a molecule

Space for Rough Work

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