PCE - 2007

Test Booklet Code **D**

Test Booklet No. 175488

This booklet contains 16 pages.
DO NOT open this Test Booklet until you are asked to do so.

Important Instructions :-

1. The PHYSICS-CHEMISTRY test is consist of **80** questions. Each question carries **1** mark. For each correct response the candidate will get **1** mark. For each incorrect response,¼ mark will be deducted. The maximum marks are **80**.
2. The Test is of **2 hour** duration.
3. Use **Black Ball Point Pen only** for writing particulars on OMR Answer Sheet marking ● responses.
4. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
5. **On completion of the test, the candidate must handover the Answer Sheet to the Invigilator in the Room / Hall. The candidates are allowed to take away this Test Booklet with them.**
6. The CODE for this Booklet is **D.** Make sure that the CODE printed on the Answer Sheet is the same as that on this booklet . In case of discrepancy, the candidate should immediately report the matter to the Invigiltor for replacement of both the Test Booklet and the Answer Sheet.
7. The candidate should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet.
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9. Use of white fluid for correction is not permissible on the Answer Sheet.
10. Each candidate must show, on demand his / her Admission Card to the Invigilator.
11. No candidate, without special permission of the Superintendent or Invigilator, should leave his / her seat.
12. Use of Manual Calculator is permissible.
13. The candidate should not leave the Examination Hall without handing over their Answer Sheet to the Invigilator on duty and must sign the Attendance Sheet (Patrak-01). Cases where a candidate has **not** signed the Attendance Sheet (Patrak-01) be deemed not to have handed over the Answer Sheet and dealt with as a unfair means case.
14. The candidates are governed by all Rules and Regulations of the Board with regard to their conduct in the Examination Hall. All cases of unfair means will be dealt with as per Rules ans Regulations of the Board.
15. No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.
16. The candidates will write the Correct Test Booklet Code as given in the Test Booklet / Answer Sheet in the Attendance Sheet. (Patrak-01)

Candidate's Name:.....

Exam.Seat No. (in figures).....(in words).....

Name of Exam. Centre:.....Exam. Centre No:.....

Test Booklet Code : ..... Test Booklet No.: .....

Candidate's Sign..... *Block Supt. Sign* .....

PHYSICS

1. Domain formation is the necessary feature of

A) all of the above
B) ferromagnetism
C) paramagnetism
D) diamagnetism

2. A coil of self inductance 0.5 mH carries a current of 2A. The energy stored in Joule is

A) 1.0
B) 0.1
C) 0.5
D) 0.05

3. A LCR series A.C circuit is tuned to resonance. The impedance of the circuit is now

A) R
B) $\left[R^2+\left(\frac{1}{wC}-wL\right)^2\right]^{1/2}$
C) $\left[R^2+(wL)^2+\left(\frac{1}{wC}\right)^2\right]^{1/2}$
D) $\left[R^2+\left(wL-\frac{1}{wC}\right)^2\right]^{1/2}$

4. Resonance frequency of LCR series a.c. circuit is f_0. Now the capacitance is made 4 times, then the new resonance frequency will become

A) $\frac{f_0}{4}$
B) $2f_0$
C) f_0
D) $\frac{f_0}{2}$

5. If the earth did not have atmosphere, the temperature would be

A) none
B) less
C) more
D) same

6. Write dimensional formula for the intensity of radiation.

A) $M^1L^0T^3$
B) $M^1L^0T^{-3}$
C) $M^1L^2T^{-2}$
D) $M^1L^2T^{-3}$

(Space for Rough Work)

7. A wavelength of a monochromatic light in vacuum is λ. It travels from vacuum to a medium of absolute refractive index μ. The ratio of wavelength of the incident and refracted wave is .....

A) $\mu^2 : 1$ B) $1 : 1$

C) $\mu : 1$ D) $1 : \mu$

8. An object is placed at a distance of 40 cm in front of a concave mirror of focal length 20 cm. The image produced is

A) real, inverted and smaller in size B) real, inverted and of same size

C) real and erect D) virtual and inverted

9. The phenomenon of polarization of electromagnetic waves proves that the electromagnetic waves are

A) neither longitudinal nor transverse B) mechanical

C) longitudinal D) transverse

10. The limit of resolution of an optical instrument arises on account of

A) reflection B) diffraction

C) polarization D) interference

11. Two waves coming from two coherent sources having different intensities interfere their ratio of maximum intensity to the minimum intensity is 25. The intensities of the sources are in the ratio

A) 25 : 1 B) 25 : 16

C) 9 : 4 D) 5 : 1

12. The threshold wavelength for a metal having work function W_0 is λ_0. What is the threshold wavelength for a metal whose work function is $\frac{W_0}{2}$?

A) $4\lambda_0$ B) $2\lambda_0$

C) $\frac{\lambda_0}{2}$ D) $\frac{\lambda_0}{4}$

(Space for Rough Work)

13. Which of the following has the longest de-Broglie wavelength if they are moving with same velocity ?

A) neutron
B) proton
C) α particle
D) β-particle

14. When a point source of light is at a distance of 50 cm from a photoelectric cell, the stopping voltage is found to be V_0. If the same source is placed at a distance of 1 m from the cell, the stopping voltage will be

A) $2V_0$
B) V_0
C) $\frac{V_0}{2}$
D) $\frac{V_0}{4}$

15. A nucleus at rest splits into two nuclear parts having same density and radii in the ratio 1 : 2. Their velocities are in the ratio,

A) 2 : 1
B) 4 : 1
C) 6 : 1
D) 8 : 1

16. In Rutherford's α-scattering experiment, what will be the correct angle of scattering for impact parameter $b = 0$?

A) 180^0
B) 0^0
C) 270^0
D) 90^0

17. The wavelength of the matter waves is independent of

A) charge
B) momentum
C) velocity
D) mass

18. The potential energy of the orbital electron in the ground state of hydrogen atom is $-E$. What is its kinetic energy ?

A) $4E$
B) $2E$
C) $\frac{E}{2}$
D) $\frac{E}{4}$

(Space for Rough Work)

19. Boolean expression for OR gate is

A) $Y = A \cdot B$
B) $Y = \bar{A} + \bar{B}$
C) $Y = A + B$
D) $Y = \bar{A}$

20. When radio waves passes through ionosphere, phase difference between space current and capacitive displacement current is

A) 0 rad
B) $\frac{3\pi}{2}$ rad
C) $\frac{\pi}{2}$ rad
D) π rad

21. Which of the following device is full duplex ?

A) Mobile-phone
B) Walky-talky
C) Loud speaker
D) Radio

22. N-type semiconductor is obtained on doping intrinsic germanium by

A) Gold
B) Boron
C) Aluminium
D) phosphorus

23. A hole in a P-type semi conductor is ..... in a covalent bond.

A) a donor level
B) a missing atom
C) a missing electron
D) an excess electron

24. N–P–N transistors are preferred to P–N–P transistors because they have

A) electrons have high mobility than holes and hence mobility of energy
B) capable of handling large power
C) low dissipation of energy
D) low cost

(Space for Rough Work)

25. A point charge causes an electric flux of $-1.0\times10^3 Nm^2C^{-1}$ to pass through a spherical Gaussian surface of 10.0 cm radius centred on the charge. If the radius of the Gaussian surface were three times, how much flux would pass through the surface ?

A) $3.0\times10^3 \frac{Nm^2}{C}$ B) $-1.0\times10^3 \frac{Nm^2}{C}$

C) $-3.0\times10^3 \frac{Nm^2}{C}$ D) $-2.0\times10^3 \frac{Nm^2}{C}$

26. An electric dipole coinsides on Z-axis and its mid point is on origin of the co-ordinate system. The electric field at an axial point at a distance z from origin is $\vec{E}(z)$ and electric field at an equatorial point at a distance y from origin is $\vec{E}(y)$. Here $z = y >> a$, So $\frac{|\vec{E}(z)|}{|\vec{E}(y)|}$ = ...

A) 1 B) 4

C) 3 D) 2

27. A stationary charge produces

A) none of these fields B) electric field and magnetic field both

C) a magnetic field only D) an electric field only

28. An electric field is spread uniformly in Y-axis. Consider point A as origin point. The co-ordinates of point B are equal to $(0, 2)$m. The co-ordinates of point C are $(2, 0)$m. At points A, B and C, electric potentials are V_A, V_B and V_C respectively. From the following options which is correct ?

A) $V_A = V_C < V_B$ B) $V_A = V_B = V_C$

C) $V_A = V_B > V_C$ D) $V_A = V_C > V_B$

29. To increase the charge on the plates of a capacitor means

A) to decrease the potential difference between the plates

B) to decrease the capacitance of the capacitor

C) to increase the capacitance of the capacitor

D) to increase the potential difference between the plates

(Space for Rough Work)

30. If the uniform surface charge density on the infinite plane sheet is σ, electric field near the surface will be

A) $\frac{\sigma}{2\varepsilon_0}$ B) $\frac{3\sigma}{\varepsilon_0}$

C) $\frac{\sigma}{\varepsilon_0}$ D) $\frac{2\sigma}{\varepsilon_0}$

31. Work done in placing a charge of $8\times10^{-18}C$ on a capacitor of capacitance 800 microfarad is

A) 4×10^{-32}J B) 32×10^{-32}J

C) 3.1×10^{-26}J D) 16×10^{-32}J

32. Two identical coils having same number of turns and carrying equal current have common centre and their planes are at right angles to each other. What is the ratio of magnitude of the resultant magnetic field at the centre and magnetic field due to one of the coils at the centre ?

A) $\sqrt{2}:1$ B) $1:\sqrt{2}$

C) 2 : 1 D) 1 : 1

33. Current of 10 A and 2 A are passed through two parallel wires A and B respectively in opposite directions. If the wire A is infinitely long and length of the wire B is 2m, the force acting on the conductor B which is situated at 10 cm distance from A will be

A) $4\pi\times10^{-7}N$ B) $5\times10^{-5}N$

C) $8\pi\times10^{-7}N$ D) $8\times10^{-5}N$

34. A voltmeter has a resistance of G ohm and range of V volt. The resistance required in series to convert it into a voltmeter of range nV volt is

A) nG B) $(n-1)G$

C) $\frac{G}{n-1}$ D) G/n

(Space for Rough Work)

35. If velocity of an electron is $\left(2\hat{i}+3\hat{j}\right)\text{ms}^{-1}$ and it enters in the magnetic field of $4\hat{k}T$, then

A) it will move in the opposite direction to the magnetic field

B) it will move in the direction of the magnetic field

C) its speed will change

D) direction of its velocity will change

36. An electron having $182\,eV$ kinetic energy is moving on a circular path in a magnetic field of $10^{-4}T$. The speed of the electron is ..... (mass of electron $m = 9.1 \times 10^{-31}$ kg)

A) $8\times10^{7}\text{ms}^{-1}$ B) $16\times10^{7}\text{ms}^{-1}$

C) $4\times10^{7}\text{ms}^{-1}$ D) $32\times10^{14}\text{ms}^{-1}$

37. A bar magnet of magnetic moment $\overrightarrow{M}$, is placed in a magnetic field of induction $\overrightarrow{B}$. The torque exerted on it is

A) $-\overrightarrow{B}\cdot\overrightarrow{M}$ B) $\overrightarrow{M}\times\overrightarrow{B}$

C) $-\overrightarrow{M}\cdot\overrightarrow{B}$ D) $\overrightarrow{M}\cdot\overrightarrow{B}$

38. To convert a galvanometer into an ammeter, we connect

A) high resistance in parallel with it B) high resistance in series with it

C) low resistance in parallel with it D) low resistance in series with it

39. The dimensions of RC are same as the dimensions of which of the following ?

A) RLC B) R/L

C) LR D) L/R

40. What is the self inductance of a coil which produces, self induced emf of 5V, when the current changes from 3A to 2A in one millisecond ?

A) 5 mH B) 5 H

C) 50 H D) 5000 H

(Space for Rough Work)

CHEMISTRY

41. Unit of K for third order reaction is .....

A) $\left(\frac{\text{Litre}}{\text{Mole}}\right)\cdot\text{sec}$

B) $\left(\frac{\text{Mole}}{\text{Litre}}\right)\cdot\text{sec}$

C) $\left(\frac{\text{Litre}}{\text{Mole}}\right)^{-1}\cdot\text{sec}^{-1}$

D) $\left(\frac{\text{Mole}}{\text{Litre}}\right)^{-2}\cdot\text{sec}^{-1}$

42. A reaction is of the first order relative to A and is of second order relative to B. What will be the effect on rate if the concentrations of A and B are doubled ?

A) Velocity remains constant

B) 4 times

C) 2 times

D) 8 times

43. $Ag_{(s)}\left|Ag^{+}(aq)_{(0.01M)}\right|\left|Ag^{+}(aq)_{(0.1M)}\right|Ag_{(s)}$

$E^{0}Ag_{(s)}/Ag_{(aq)} = 0.80$ Volt

A) Cell can not function as anode and cathode are of same metal

B) $E_{cell} = 0.0592V$

C) $E_{cell} = 0.80V$

D) $E_{cell} = 0.0296V$

44. Freezing point of urea solution is $-0.6^{0}C$. How much urea (M.W.= 60 gm/mole) required to dissolved in 3 kg water ? ($K_f = 1.5^{0}C\,\text{kg}\,\text{mol}^{-1}$)

A) 3.6 gm

B) 2.4 gm

C) 7.2 gm

D) 6.0 gm

45. If $K < 1.0$, what will be the value of ΔG^{0} of the following ?

A) 1.0

B) Zero

C) Negative

D) Positive

(Space for Rough Work)

46. Cellulose is soluble in .....

A) None of these
B) Ammonical cupric hydroxide solution
C) Organic solvents
D) Water

47. Which of the following acts as best semipermeable membrane ?

A) Parchment paper
B) $Cu_2\left[Fe(CN)_6\right]$
C) Plant cell wall
D) Cellophane

48. Which observation will be given by

$$CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\underset{|}{\overset{|}{C}}}}-CH_2\cdot OH$$

A) Oily drops are separated
B) Solution becomes milky
C) Reaction does not take place
D) Coloured layer

49. How many *O*-atoms are shared per SiO_4 tetrahedral in silicate anion of beryl mineral ?

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

50. A metallic crystal having BCC type stacking pattern, what percentage of volume of this lattice is empty space ?

A) 68 %
B) 32 %
C) 26 %
D) 74 %

51. What is the energy gap between valence band and conduction band in crystal of insulators ?

A) Both the bands are overlapped with each other
B) Very small
C) Infinite
D) Very large

52. The physical states of dispersing phase and dispersion medium in colloid like pesticide spray respectively are :

A) Solid, gas
B) Gas, liquid
C) Liquid, gas
D) Liquid, solid

(Space for Rough Work)

53. $E_{cell} = 0.78$ Volt for the following cell.

$$Fe_{(s)} \left| Fe^{2+}_{(aq)} \right| \left| Cu^{2+}_{(aq)} \right| Cu_{(s)}$$
$$(xM) \quad (0.01M)$$

$$E^0 Fe/Fe^{2+}_{(aq)} = 0.44V, E^0 Cu/Cu^{2+}_{(aq)} = -0.34V$$

A) x cannot be predicted
B) $x = 0.01M$
C) $x > 0.01M$
D) $x < 0.01M$

54. Which scientists diffracted the moving electron by using Ni metal crystal like X-rays ?

A) Max Plank and Hemilton
B) De-Broglie and Schrodinger
C) Goudsmit and Uhlenbeck
D) Davison and Germer

55. Which of the following is used as an oxidising agent in hybrid fuel ?

A) CrO_3
B) Cr_2O_3
C) N_2O_4
D) H_2O_2

56. Select the basic dye from the following

A) Methyl Red
B) Congo Red
C) Melachite Green
D) Methyl Orange

57. Which of the following is incorrect for Glucose ?

A) it contains four $-\underset{|}{C}HOH$ group
B) it contains one ketone group
C) it contains one $-CH_2OH$ group
D) it contains one $-CHO$ group

58. Deficiency of Vitamin H causes

A) Skin diseases
B) Scurvy
C) Burning of eyes
D) Anaemia

59. The correct formula of salt formed by the neutralisation of hypophosphorous acid with $NaOH$ is :

A) Na_3PO_2
B) Na_3PO_3
C) NaH_2PO_2
D) Na_2HPO_2

(Space for Rough Work)

60. What is the percentage of sulphur used in vulcanization of rubber ?

A) 05 %
B) 03 %
C) 30 %
D) 55.0 %

61. Which of the following will be obtained on acetylation of aniline ?

A) Paracetamol
B) *N*-acetyl amino benzene
C) *O*- amino acetophenone
D) *P*-amino acetophenone

62. How many Faradays are needed for reduction of 2.5 mole of $Cr_2O_7^{2-}$ into Cr^{3+} ?

A) 15
B) 12
C) 6
D) 3

63. What is an oxidation number of carbonyl carbon in Methanal ?

A) + 3
B) + 2
C) + 4
D) zero

64. Which of the following is general formula of aldehyde and ketone ?

A) $C_nH_{2n+2}\cdot O$
B) $C_nH_{2n}\cdot O_2$
C) $C_nH_{2n}\cdot O$
D) $C_nH_{2n+1}\cdot O$

65. Which of the following compound results into benzene nitrile on its dehydration ?

A) Benzoic acid
B) Benzamide
C) Benzo phenone
D) Benzoyl chloride

66. What will be the bond angle *C–O–H* in alcohol if hybridisation of *C* and *O* atom possess sp^3 hybridisation ?

A) $109^0 28'$
B) $111^0 42'$
C) 109^0
D) $108^0 30'$

67. Which of the following is correct based on Molecular orbital theory for peroxide ion ?

A) Its bond order is two and it is diamagnetic
B) Its bond order is one and it is paramagnetic
C) Its bond order is two and it is paramagnetic
D) Its bond order is one and it is diamagnetic

68. The number of racemic mixture obtained by optical isomers of 2,3-dihydroxy butanal is / are :

A) Three
B) Two
C) One
D) Zero

(Space for Rough Work)

69. What is the correct Nernst equation for reaction taking place in the following cell

$Mg_{(s)}\left|Mg^{2+}(aq)\right|\left|Cl^{-}(aq)\right|Cl_{2(g)}(1atm)\left|pt\right.$?

A) $E_{cell}=E^{0}_{cell}-\frac{0.0592}{n}\times Log\frac{\left[Cl^{-}\right]^{2}}{\left[Mg^{2+}\right]}$

B) $E_{cell}=E^{0}_{cell}-\frac{0.0592}{n}\times Log\frac{\left[Mg^{2+}\right]}{\left[Cl^{-}\right]}$

C) $E_{cell}=E^{0}_{cell}-\frac{0.0592}{n}\times Log\left[Mg^{2+}\right]\left[Cl^{-}\right]^{2}$

D) $E_{cell}=E^{0}_{cell}-\frac{0.0592}{n}\times Log\frac{\left[Mg^{2+}\right]}{\left[Cl^{-}\right]^{2}}$

70. In a decay series, $^{206}_{82}Pb$ is obtained at the end from $^{238}_{92}U$. How many particles must have been emitted ?

A) 8 B) 7

C) 6 D) 5

71. The half life period of a radio active material is 15 minutes. What percentage of radioactivity of that material will remain after 45 minutes ?

A) 17.5 % B) 15 %

C) 12.5 % D) 10 %

72. Which of the following complex does not show geometrical isomerism ?

A) $\left[Co(NH_3)_4Cl_2\right]^{+}$ B) $\left[Fe(NH_3)_2(CN)_4\right]^{-}$

C) $\left[Cr(OX)_3\right]^{3-}$ D) $\left[Co(NH_3)_3(NO_2)_3\right]$

(Space for Rough Work)

73. What will be the theoretical value of magnetic momentum (μ), when CN^- ligands join Fe^{3+} ion to yield complex.

A) 2.83 BM
B) 3.87 BM
C) 5.92 BM
D) 1.73 BM

74. In which of the following ions, *d-d* transition is not possible ?

A) Ti^{4+}
B) Cr^{3+}
C) Mn^{2+}
D) Cu^{2+}

75. Of the following outer electronic configuration of atoms, the highest oxidation state is achieved by which one of them ?

A) $(n-1)d^5ns^2$
B) $(n-1)d^8ns^2$
C) $(n-1)d^5ns^1$
D) $(n-1)d^3ns^2$

76. Which one of the following ore is not an ore of *Al* ?

A) Anglesite
B) Mica
C) Beryl
D) Orthoclase

77. Which of the following is isolated in pure form ?

A) $HClO_4$
B) $HClO_3$
C) $HClO_2$
D) $HClO$

78. Which of the following has the highest proton affinity ?

A) Stibine (SbH_3)
B) Arsine (AsH_3)
C) Phosphine (PH_3)
D) Ammonia (NH_3)

79. Peptisation is the process in which .....

A) Suspension is converted into true solution.
B) Precipitates dissolve to give true solution.
C) Colloid particles gets settled as precipitates.
D) Precipitates are converted into colloid.

80. The coagulating power of an electrolyte for arsenious sulphide sol decreases in the order,

A) $Al^{3+} > Ba^{2+} > Na^+$
B) $Cl^- > SO_4^{2-} > PO_4^{3-}$
C) $PO_4^{3-} > Cl^- > SO_4^{2-}$
D) $Na^+ > Al^{3+} > Ba^{2+}$

(Space for Rough Work)

(Space for Rough Work)