INSPIRING MINDS

where success reflects...

IIT-JEE/MEDICAL/BOARDS

JEE-MAINS

PHYSICS: ELECTROSTATICS

CHEMISTRY: SOLID STATES

MATHEMATICS : Matrices & Determinants

2018

Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.

INSTRUCTIONS

A. General:

(i) The Test Booklet consists of 90 questions. The maximum marks are 360.

(ii) Each question is allotted **4 (four)** marks for each correct response for physics and chemistry and 2 marks for biology

(iii) Candidates will be awarded marks as stated above in instruction No. (ii) for correct response of each question, 1/4 (one fourth) marks will be deducted for indicating incorrect response of each question. **No deduction** from the total score will be made **if no response** is indicated for an item in the answer sheet.

(iv) There is only one correct response for each question. Filling up more than one response in each question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instruction (iii) above.

(v) Use Blue/Black Ball Point Pen only for writing particulars or any marking.

(vi) Use of calculator is not allowed.

(vii) Darken the circles in the space provided only.

(viii) Use of white fluid or any other material which damages the answer sheet, is not permitted.

Name:-...........................

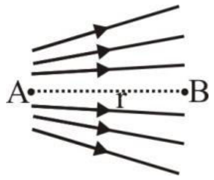
Contact no:-.....................

INSPIRING MINDS SCO 36-37 DLF ROAD, PATIALA **Ph No.** 7508272168

JEE-MAINS [PART(A)]

PHYSICS

1. **Figure shows the electric lines of force emerging from a charged body. If the electric field at *A* and *B* are E_A and E_B respectively and if the distance between *A* and *B* is *r*, then**



(a) $E_A > E_B$ (b) $E_A < E_B$

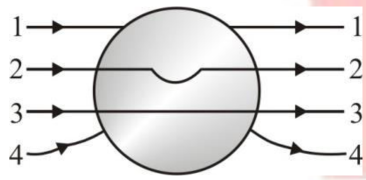
(c) $E_A = \frac{E_B}{r}$ (d) $E_A = \frac{E_B}{r^2}$

2 **The separation at which the force between a proton and an electron will be 1 milli newton** is

(a) 4.8×10^{-13} m (b) 4.8×10^{-11} m

(c) 4.9×10^{-9} m (d) 4.8×10^{-7} m

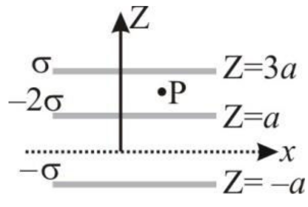
3. **A metallic solid sphere is placed in a uniform electric field. The lines of force follow the path(s) shown in figure as**



(a) 1 (b) 2

(c) 3 (d) 4

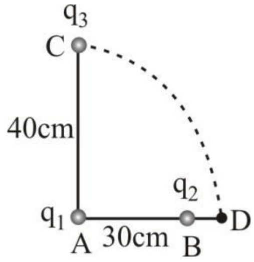
4 **Three infinitely long charge sheet are placed as shown in figure. The electric field at point *P* is**



(a) $\frac{2\sigma}{\varepsilon_0}\hat{k}$ (b) $-\frac{2\sigma}{\varepsilon_0}\hat{k}$

(c) $\frac{4\sigma}{\varepsilon_0}\hat{k}$ (d) $-\frac{4\sigma}{\varepsilon_0}\hat{k}$

5. **Two charges q_1 and q_2 are placed 30cm apart, as sown in the figure. A third charge q_3 is moved along the arc of a circle of radius 40 cm from C to D. The change in the potential energy of the system is $\frac{q_3}{4\pi\varepsilon_0}k$, where k is**



(a) $8q_2$ (b) $8q_1$

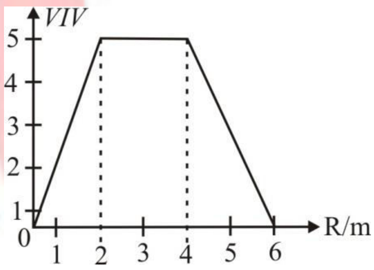
(c) $6q_2$ (d) $6q_1$

6 **An electric field is expressed as $\vec{E} = 2\hat{i} + 3\hat{j}$. Find the potential difference ($V_A - V_B$) between two points *A* and *B* whose position vectors are given by** $r_A = \hat{i} + 2\hat{j}$ and $r_B = 2\hat{i} + \hat{j} + 3\hat{k}$.

(a) –1 V (b) 1 V

(c) 2 V (d) 3 V

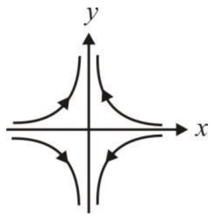
7. **The variation of potential with distance R from fixed point is shown in figure. The electric filed at R = 5m is**

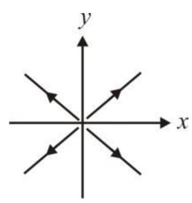


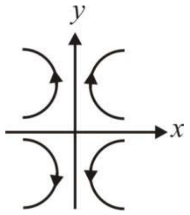
(a) 2.5 Vm^{-1} (b) –2.5 Vm^{-1}

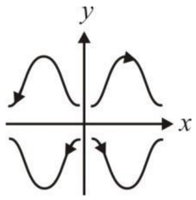
(c) 0.4 Vm^{-1} (d) –0.4 Vm^{-1}

8. **The potential field depends on *x*-and *y*-coordinates as $V = x^2 - y^2$. Corresponding electric field lines in $x - y$ plane are as**

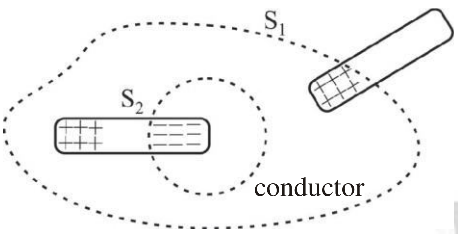
(a) 

(b) 

(c) 

(d) 

9. **Charge on an originally uncharged conductor is separated by holding a positively charged rod very nearby, as in figure Assume that the induced negative charge on the conductor is equal to the positive charge *q* on the rod. Then, flux through surface S_1 is**



(a) zero (b) q/ε_0

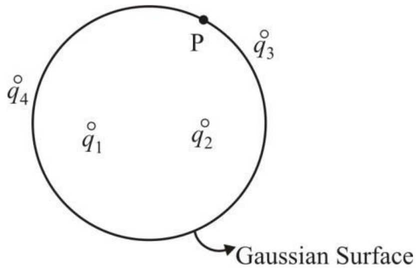
(c) $-q/\varepsilon_0$ (d) none of these

10. **A cylinder of length L and radius b has its axis coincident with the *x*-axis. The electric field in this region is $\vec{E} = 200\hat{i}$. Find the flux through the left end of cylinder.**

(a) 0 (b) $200\pi b^2$

(c) $100\ \pi b^2$ (d) $-200\pi b^2$

11. **Consider the Gaussian surface that surrounds part of the charge distribution shown in figure. Then, the contribution to the electric field at point *P* arises from charges**



(a) q_1 and q_2 only

(b) q_3 and q_4 only

(c) q_1, q_2, q_3 and q_4

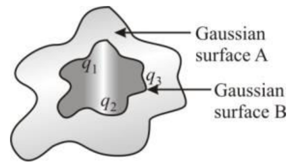
(d) none of the above

12 **A charge *q* is distributed uniformly on a ring of radius '*a*'. A sphere of equal radius '*a*' is constructed with its center at the periphery of the ring. Calculate the flux of the electric field through the surface of the sphere.**

(a) $\dfrac{q}{3\varepsilon_0}$ (b) $\dfrac{2q}{3\varepsilon_0}$

(c) $\dfrac{q}{4\varepsilon_0}$ (d) $\dfrac{3q}{4\varepsilon_0}$

13 **The electric flux for Gaussian surface A that enclose the charged particles in free space is (given $q_1 = -14$ nC, $q_2 = 78.85$ nC, $q_3 = -56$ nC)**



(a) $10^3\ Nm^2\ C^{-1}$

(b) $10^3\ CN^{-1}\ m^{-2}$

(c) $6.32 \times 10^3\ Nm^2\ C^{-1}$

(d) $6.32 \times 10^3\ CN^{-1}\ m^{-2}$

14. **If the electric flux entering and leaving an enclosed surface respectively is ϕ_1 and ϕ_2 the electric charge inside the surface will be**

(a) $(\phi_1 + \phi_2)\varepsilon_0$ (b) $(\phi_2 - \phi_1)\varepsilon_0$

(c) $(\phi_1 + \phi_2)/\varepsilon_0$ (d) $(\phi_2 - \phi_1)/\varepsilon_0$

15. **The inward and outward electric flux for a closed surface in units of N–m²/C are respectively 8×10^3 and 4×10^3. Then the total charge inside the surface is [where ε_0 = permittivity constant]**

(a) 4×10^3 C (b) -4×10^3 C

(c) $\dfrac{(-4\times10^3)}{\varepsilon}C$ (d) $-4 \times 10^3\ \varepsilon_0$ C

16. **A positively charged ball hangs from a long silk thread. Electric field at a certain point (at the same horizontal level of ball) due to this charge is *E*. Let us put a positive test charge q_0 at this point and measure F/q_0 on this charge. Then, *E***

(a) $> F/q_0$ (b) $< F/q_0$

(c) $= F/q_0$ (d) none of these

Q17.Two capacitors of 2μF and 4μF are connected in parallel. A third capacitor of 6μF is connected in series. The combination connected across a 12V battery. The voltage across 2μF capacitor is

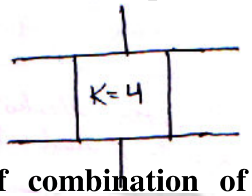
(a)2V (b)8V (c)6V (d)1V

Q18 A 40μF capacitor in a defibrillator is charged to 3,000V. The energy stored in the capacitor is sent through the patient during a pulse of duration 2ms. The power delivered to the patient is.

(A) 45 kW (B) 360 kW

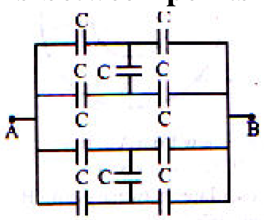
(C) 180 kW (D) 90 kW

Q19.Consider a parallel plate capacitor of $10\ \mu F$ with air filled in the gap between the plates. Now one half of the space b/w the plates is filled with dielectric of dielectric constant 4, as shown fig. The capacity of the capacitor changes to



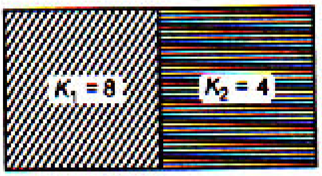
(a) 25 μF (b) 20 μF (c) 40 μF
(d) 5 μF Q

Q20.The effective capacitance of combination of equal capacitors between points A and B shown in fig is



(a)C (b) 2C (c) 3C (d) C/2

Q21.A capacitor having capacitance 1 micro farad with air,is filled with two dielectric as shown.How many times capacitance will increase?



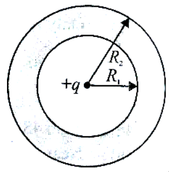
(a)12 (b)6 (c)8/3 (d)3

Q22. Given a number of capacitors labelled as 8μF–250V. Find the minimum number of capacitors needed to get an arrangement equivalent to 16 μF–1,000 V.

(A) 32 (B) 16

(C) 4 (D) 64

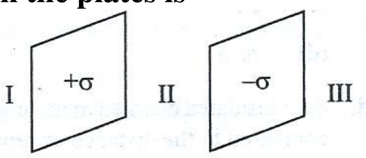
Q23A metallic spherical shell has an inner radius R_1 and outer radius R_2 .A charge is placed at the centre of the spherical cavity. The surface charge density on the inner surface is



c

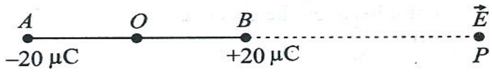
(a) $\frac{q}{4\pi R_1^2}$ (b) $\frac{-q}{4\pi R_1^2}$ (c) $\frac{q^2}{4\pi R_2^2}$ (d) $\frac{q}{4\pi R_2^2}$

Q24.Two large thin metal plates are paralle; and close to each other .On their inner faces,the plates have surface charge densities of opposite signs and magnitude $27\times10^{-22}Cm^{-2}$ .The electric field $\vec{E}$ in region II in between the plates is



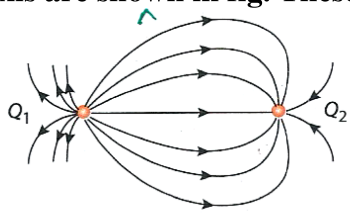
(a) $4.25\times10^{-8}\ NC^{-1}$ (b) $6.28\times10^{-10}NC^{-1}$
(d) $3.05\times10^{-10}NC^{-1}$ (d) $5.03\times10^{-10}NC^{-1}$

Q25.Two charges ±20μC are placed 10mm apart.The electric field at point P,on the axis of the dipole 10 cm away from its centre O on the side of the positive charge is



(a) $8.6\times10^{9}NC^{-1}$ (b) $4.1\times10^{6}NC^{-1}$
(c) $3.6\times10^{6}NC^{-1}$ (d) $4.6\times10^{5}NC^{-1}$

Q26.A few electric field lines for a system of two charges Q_1 and Q_2 fixed at two different points on the x-axis are shown in fig. These lines suggests that



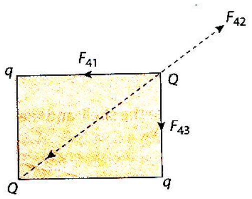
(a) $|Q_1|>|Q_2|$
(b) $|Q_1|<|Q_2|$
(c) At a finite distance to the left of Q_1 ,the electric field is zero.
(d)At a finite distance to the right of Q_2 ,the electric field is net zero.

Q27.A dipole of electric dipole moment p is placed in a uniform electric field of strength E.If θ is the

angle between positive directions of p and E,then the potential energy of the electric dipole is largest when θ is

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$ (c) π (d)zero

Q28. A charge Q is placed at each of the opposite corners of a square and a charge q is placed at each of the other two corners as shown in fig.If the net electrical force on Q is zero,then Q/q equal



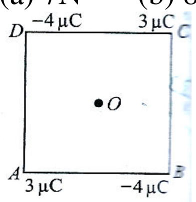
a) $-2\sqrt{2}$ (b)-1 (c)1 (d)-1/$\sqrt{2}$

Q29.An electric dipole is placed at an angle of 30^0 with an electric field of intensity 2×10^5 N/C.It experience a torque equal to 4Nm.The charge on the dipole if the dipole length is 2cm is

(a)8mC (b)4mC (c)6mC (d)2mC

Q30.Four point charges are placed at the corners of a square ABCD of side 10cm,as shown in figure .The force on a charge of 1μC placed at the centre of square is

(a) 7N (b) 8N (c)2N (d) zero



CHEMISTRY

1. Which of the following exists as covalent crystals in the solid state?

(a) *Phosphorus* (b) *Iodine*

(c) *Silicon* (d) *Suluphur*

2. In a face centred cubic lattice, atom A occupies the corner positions and atom B occupies the face centre positions. If one atom of B is missing from one of the face centred points, the formula of the compound is :

(a) AB_2 (b) A_2B_3

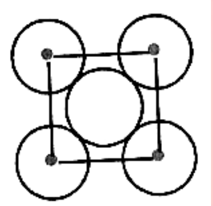
(c) A_2B_5 (d) A_2B

3. The fraction of the total volume occupied by the atoms present in a simple cube is

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{6}$

(c) $\frac{\pi}{3\sqrt{2}}$ (d) $\frac{\pi}{4\sqrt{2}}$

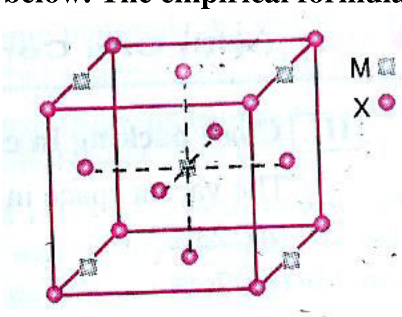
4. The packing efficiency of the two-dimensional square unit cell shown in the adjoining fig is.



(a)39.27% (b) 68.02%

(c)74.05% (d)78.54%

5. A compound $M_p X_q$ has cubic close packing (ccp) arrangement of X. Its unit cell structure is shown below. The empirical formula of the compound is



(a) MX (b) MX_2

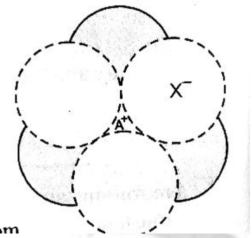
(c) M_2X (d) M_5X_{14}

6. If the unit cell of a mineral has a cubic close packed (ccp) array of oxygen atoms with m fraction of octahedral holes occupied by aluminium ions and n fraction of tetrahedral holes occupied by magnesium ions, m and n, respectively are

$(a)\frac{1}{2},\frac{1}{8}$ $(b)1,\frac{1}{4}$

$(c)\frac{1}{2},\frac{1}{2}$ $(d)\frac{1}{4},\frac{1}{8}$

7. The arrangement of X^- ions around A^+ ion in solid AX is given in the fig. (not drawn to scale). If the radius of X^- is 250 pm, the radius of A^+ is



$(a)104\,pm$ $(b)125\,pm$

$(c)183\,pm$ $(d)57\,pm$

8. In calcium fluoride, having the fluorite structure, the coordination numbers for calcium ion (Ca^{2+}) and fluoride ion (F^-) are

$(a)4\,and\,2$ $(b)6\,and\,6$

$(c)8\,and\,4$ $(d)4\,and\,8$

9. A solid compound XY has NaCl structure. If the radius of the cation is 100 pm, the radius of the anion (Y^-) will be

$(a)275.1$ $(b)322.5\,pm$

$(c)241.5\,pm$ $(d)165.7\,pm$

10. A metal crystallizes with a face-centred cubic lattice. The edge of the unit cells is 408 pm. The diameter of the metal atom is

$(a)228\,pm$ $(b)408\,pm$

$(c)144\,pm$ $(d)204\,pm$

11. Sodium metal crystallizes in a body-centred cubic lattice with a unit cell edge of 4.29A°. The radius of sodium metal is approximately

$(a)5.72\,A°$ $(b)0.93A°$

$(c)1.86A°$ $(d)3.22A°$

12. A given metal crystallizes out with a cubic structure having edge length of 361 pm. If there are four metal atoms in one unit cell, what is the radius of one atom?

$(a)80\,pm$ $(b)108\,pm$

$(c)40\,pm$ $(d)127\,pm$

13. CsCl crystallises in body-centred cubic lattice. If 'a' is its edge length then which of the following expressions is correct?

$(a)r_{cs}+r_{Cl-}=\sqrt{3}a$

$(b)\,r_{cs}+r_{Cl-}=3a$

$(c)\,r_{cs}+r_{Cl-}=\frac{3a}{2}$

$(d)\,r_{cs}+r_{Cl-}=\frac{\sqrt{3}}{2}a$

14. If 'a' stands for the edge length of the cubic system: simple cubic, body centred cubic and face-centred cubic, then the ratio of the radii of the spheres in these systems will be respectively

$(a)\frac{1}{2}a:\frac{\sqrt{3}}{4}a:\frac{1}{2\sqrt{2}}a$

$(b)\frac{1}{2}a:\sqrt{3}a:\frac{1}{2}a$

$(c)\frac{1}{2}a:\frac{\sqrt{3}}{2}:\frac{\sqrt{2}}{2}a$

$(d)1a:\sqrt{3}a:\sqrt{2}a$

15. A metal has a fcc lattice. The edge length of the unit cell is 4.4 pm. The density of the metal is 2.72 g cm^{-3} . The molar mass of the metal is (N_A, Avogadro's constant = 6.02 × 10^{23} mol^{-1})

$(a)40\,g\,mol^{-1}$ $(b)30\,gmol^{-1}$

$(c)27\,g\,\,mol^{-1}$ $(d)20\,g\,mol^{-1}$

16. Lithium has a bcc structure. Its density is 530 kg m^{-3} and its atomic mass is 6.94 g mol^{-1} Calculate the edge length of the unit cell of lithium metal (N_A = 6.02 × 10^{23} mol^{-1})

$(a)527\,pm$ $(b)264\,pm$

$(c)154\,pm$ $(d)352\,pm$

17. If NaCl is doped with 10^{-4} mol% of $SrCl_2$, the concentration of cation vacancies will be (N_A= 6.02× 10^{23} mol^{-1})

(a) $6.02 \times 10^{14} mol^{-1}$

(b) $6.02 \times 10^{15} mol^{-1}$

(c) $6.02 \times 10^{16} mol^{-1}$

(d) $6.02 \times 10^{17} mol^{-1}$

18. Experimentally. It was found that a metal oxide has formula $M_{0.98}O$. Metal M is present as M^{2+} and M^{3+} in its oxide. Fraction of the metal which exists as M^{3+} would be

(a) 5.08% (b) 7.01%

(c) 4.08% (d) 6.05%

19. Which of the following compound is metallic and ferromagnetic?

(a) CrO_2 (b) VO_2

(c) MnO_2 (d) TiO_2

20. The correct statement (s) regarding defects in solids is (are)

(a) Frenkel defects are usually favoured by a very small difference in the sizes of the cation and anion

(b) Frenkel defect is a dislocation defect

(c) Trapping of an electron in the lattice leads to the formation of F – centre

(d) Schottky defects have no effect on the physical properties of solids

21. With respect to graphite and diamond, which of the following statement (s) given below is (are) correct?

(a) Graphite is harder than diamond

(b) Graphite is higher electrical conductivity than diamond

(c) Graphite has higher thermal conductivity than diamond

(d) Graphite has higher C – C bond order than diamond

22. The Correct Statement for cubic close packed (ccp) three-dimensional structure is (are)

(a) The number of neighbours of an atom present in the topmost layer is 12

(b) The efficiency of the atom packing is 74%

(c) The number of octahedral and tetrahedral voids per atom are 1 and 2 respectively

(d) The unit cell edge length is $2\sqrt{2}$ times the radius of the atom.

23. In the laboratory, sodium chloride is made by burning sodium in the atmosphere of chlorine. The salt obtained is yellow in colour. The cause of yellow colour is

(a) presence of Na^+ ions in the crystal lattice

(b) presence of Cl^- ions in the crystal lattice

(c) presence of electrone in the crystal lattice

(d) presence of face – centred cubic crystal lattice

24. In fcc lattice of NaCl structure, if the diameter of Na^+ is x, and the radius of Cl^- is y, then the edge length of NaCl in the crystal is

(a) $2x + 2y$ (b) $x + y$

(c) $x + 2y$ (d) none of these

25. Gold has a close-packed structure which can be viewed as spheres occupying 0.74 of the total volume. What is the radius of gold ion if density of gold is 19.3 g/cc? (Au = 197 amu)

(a) 1.439×10^{-8} cm

(b) 4.07×10^{-8} cm

(c) 1.017×10^{-8} cm

(d) 8.23×10^{-8} cm

26. Ferrous oxide has a cubic structure. The length of edge of the unit cell is 5 A° . The density of the oxide is 4.0 g cm^{-3} Then the number of Fe^{2+} and O^{2-} ions present in each unit cell will be

(a) four Fe^{2+} and four O^{2-}

(b) two Fe^{2+} and two O^{2-}

(c) four Fe^{2+} and two O^{2-}

(d) two Fe^{2+} and four O^{2-}

27. KCl crystallizes in the same type of lattice as NaCl does. If r_{Na}/ r_k 0.7 then the ratio of the sides of unit cell for KCl to that for NaCl is

(a) 1.1 (b) 0.8
(c) 0.4 (d) 1.7

28. The arrangement of the first two layers, one above the other, in hcp and ccp arrangement is
(a) *exactly same in both cases*
(b) *partly same and partly different*
(c) *different from each other*
(d) *nothing definite*

29. In a cubic unit cell, seven of eight corner are occupied by atom A and corners of faces are occupied by B. The general formula of the substance having this type of structure would be
(a) A_7B_6 (b) A_7B_{24}
(c) A_7B_{12} (d) A_7B_{36}

30. Certain crystals produce electric signals on application of pressure. This phenomenon is called
(a) *pyroelectricity* (b) *ferroelectricity*
(c) *piezoelectricity* (d) *ferrielectricity*

MATHEMATICS

1. If A=$\begin{bmatrix} 2-k & 2 \\ 1 & 3-k \end{bmatrix}$ is singular matrix, then the value of $5k-k^2$ is
(a) 0 (b) 6 (c) -6
(d) -4 (e) 4

2. Let A = $\begin{bmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 3 & 2 & 1 \end{bmatrix}$, if u_1 and u_2 are column matrices such that Au_1 $\begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$ and Au_2 = $\begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$, then u_1 + u_2 is equal to

(a) $\begin{bmatrix} -1 \\ 1 \\ 0 \end{bmatrix}$ (b) $\begin{bmatrix} -1 \\ 1 \\ -1 \end{bmatrix}$
(c) $\begin{bmatrix} -1 \\ -1 \\ 0 \end{bmatrix}$ (d) $\begin{bmatrix} 1 \\ -1 \\ -1 \end{bmatrix}$

3. If A = $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ a & b & -1 \end{bmatrix}$ and I is the unit matrix of order 3, then $A^2 + 2A^4 + 4A^6$ is equal to

(a) $7A^8$ (b) $7A^7$ (c) $8I$
(d) $6I$ (e) *None of these*

4. If $\begin{bmatrix} 0 & a \\ b & 0 \end{bmatrix}^4$ = I , then
(a) $a=1=2b$ (b) $a=b$
(c) $a=b^2$ (d) $ab=1$

5. If A = $\begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$ and I is the unit matrix of order 2, then A^2 equals
(a) $4A-3I$ (b) $3A-4I$
(c) $A-I$ (d) $A+I$

6. If A and B are square matrices of size n × n such that $A^2 - B^2$ =(A-B_(A+B), then which of the following will be always correct ?

(a) AB = BA
(b) Either A or B is a zero matrix
(c) Either A or B is an identity matrix
(d) A = B

7. If A = $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and B = $\begin{bmatrix} a & 0 \\ 0 & b \end{bmatrix}$, a, b ∈ N. Then,

(a) *there exist more than one but finite number of B's such that AB = BA*

(b) *there exist exactly one B such that AB = BA*

(c) *there exists infinitely many B's such that AB = BA*

(d) *there cannot exist any B such that AB = BA*

8. If A = $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$, then A^{100} is equal to

(a) 2^{100} A (b) 2^{99} A
(c) 100 A (d) 299 A

9. If a, b and c are in AP, the value of

$\begin{vmatrix} x+2 & x+3 & x+a \\ x+4 & x+5 & x+b \\ x+6 & x+7 & x+c \end{vmatrix}$ *is*

(a) 0 (b) x - (a + b + c)
(c) a + b + c (d) $9x^2$ a + b + c

10. If a_1, a_2, a_3... are in an A.P then the value of

$\begin{vmatrix} a_1 & a_2 & 1 \\ a_2 & a_3 & 1 \\ a_3 & a_4 & 1 \end{vmatrix}$ **is**

(a) $a_4 - a_1$ (b) $a_1 + a_4 / 2$
(c) 1 (d) $a_2 + a_3 / 2$
(e) 0

11. If $\begin{vmatrix} 2a & x_1 & y_1 \\ 2b & x_2 & y_2 \\ 2c & x_3 & y_3 \end{vmatrix} = \frac{abc}{2} \neq 0$, then the area of the triangle whose vertices are (x_1/a , y_1/a), (x_2/b , y_2/b) and (x_3/c , y_3/c) is

(a) 1/4 abc (b) 1/8 abc
(c) 1/4 (d) 1/8
(e) 1/12

12. Find the area of the triangle with vertices (2, 3), (0, 1) and (1,2) .

(a) ½ sq unit (b) 0 sq unit
(c) 2 sq units (d) 2 ½ sq units

13. If P = $\begin{vmatrix} 1 & 2 & 1 \\ 1 & 3 & 1 \end{vmatrix}$ and Q = PP^T , then the value of Q is

(a) 2 (b) -2 (c) 1 (d) 0

14. Let P and Q be 3 × 3 matrices, p ≠ Q. If $P^3 = Q^3$ and $P^2 Q = Q^2 P$, then determinant of $(P^2 + Q^2)$ is equal to

(a) -2 (b) 1
(c) 0 (d) -1

15. If x, y and z are different from zero and $\begin{bmatrix} a & b-y & c-z \\ a-x & b & c-z \\ a-x & b-y & c \end{bmatrix}$ = 0, then the value of the expression $\frac{a}{x}+\frac{b}{y}+\frac{c}{z}$ is

$(a)\,0$ $(b)\,-1$
$(c)\,1$ $(d)\,2$

16. If matrix $\begin{bmatrix} 0 & 1 & -2 \\ -1 & 0 & 3 \\ \lambda & -3 & 0 \end{bmatrix}$ is singular , then λ is equal to

$(a)-2$ $(b)-1$
$(c)\,1$ $(d)\,2$

17. If D = $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1+x & 1 \\ 1 & 1 & 1+y \end{bmatrix}$ for x ≠ 0 , then D is

(a) *neither divisible by x nor y*

(b) *divisible by both x and y*

(c) *divisible by x but not y*

(d) *divisible by y but not x*

18. If A = $\begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$ be such that A^{-1} = KA, then k is equal to

(a) 19 (b) 1/19 (c) -19 (d) -1/19

19. If P= $\begin{vmatrix} 1 & \alpha & 3 \\ 1 & 3 & 3 \\ 2 & 4 & 4 \end{vmatrix}$ is the adjoint of a 3 ×3 matrix A and $|A|$=4, then α is equal to

(a) 4 (b) 11 (c) 5 (d) 0

20. If $A_{3\times3}$ and $|A|$ = 6, then $|2adj\ A|$ is equal to

(a) 48 (b) 8 (c) 288 (d) 12

21.If A is a square matrix all of whose entries are integers. Then, which one of the following is correct?

(a) If $|A| = \pm1$, then A^{-1} need not exist

(b) If $|A| = \pm1$, then A^{-1} exists but all its entries are not necessarily integers

(c) If $|A| \neq \pm1$, then A^{-1} exists and all its entries are non-integers

(d) If $|A| = \pm1$, then A^{-1} exists and all its entries are integers

22. If $A^2 - A + I = 0$, then the inverse of A is

(a) I – A (b) A - I

(c) A (d) A + I

23. If system of equations x+ky-z=0, 3x- ky -z =0 and x-3y + z = 0, has non zero solution, then k is equal to

(a) -1 (b) 0 (c) 1 (d) 2

24. The number of values of k, for which the system of equations (k + 1) x + 8y =4k and kx + (k +3) y = 3k -1 has no solution, is

(a) infinite (b) 1

(c) 2 (d) 3

25. Consider the system of linear equations $x_1 + 2x_2 + x_3 = 3$, $2x_1 + 3x_2 + x_3 = 3$ $3x_1 + 5x_2 + 2x_3 = 1$ and The system has

(a) infinite number of solutions

(b) exactly 3 solutions

(c) a unique solution

(d) no solution

26. If the system of homogeneous equations 2x – y + z = 0, x – 2y + z = 0 and λ x – y + 2z = 0 has infinitely many solutions, then

(a) $\lambda = 5$ (b) $\lambda = -5$

(c) $\lambda \neq \pm 5$ (d) None of these

27. The system of equations x + y + z = 0, 2x + 3y + z = 0, and x + 2y =0 has

(a) a unique solution; x =0, y = 0 and z = 0

(b) Infinite solution

(c) no solution

(d) finite number of non-zero solutions

28. The number of non-trivial solutions of the system x – y + z = 0, x + 2y – z = 0 and 2x + y + 3z = 0, is

(a) 0 (b) 1

(c) 2 (d) 3

29. The value of a for which the system of equations x + y + z =0, x + ay + az = 0 and x – ay + z = 0 possesses non zero solutions, are given by

(a) 1, 2 (b) 1, -1

(c) 1, 0 (d) None of these

30.The system of equation ax + y + z = α-1 x + αy + z = α -1 and x + y + αz = α-1 has no solution, if α is

(a) 1 (b) not – 2

(c) either – 2 or 1 (d) – 2

NON-Medical Set- A

PHYSICS Answer key

1	2	3	4	5	6	7	8	9	10
a	a	d	b	a	a	a	a	b	d
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
c	a	a	b	d	a	c	d	a	b
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
b	a	b	c	c	a,d	c	a	d	d

CHEMISTRY Answer key

1	2	3	4	5	6	7	8	9	10
c	c	b	d	b	a	a	c	c	a
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
c	d	d	a	c	d	d	c	a	b,c
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
b,d	b,c,d	c	c	a	a	a	a	b	c

Mathematic Answer key

1	2	3	4	5	6	7	8	9	10
e	d	a	d	a	a	c	b	a	e
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
d	b	a	c	d	d	b	b	b	c
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
d	a	c	b	d	a	b	a	b	d