## Studymate Foundation Paper

Date : 23/12/2018
Duration : 90 Min.
Max. Marks : 90

## Physics, Chemistry \& Mathematics/Biology (Set-1)

CLASS
XI

## General Instructions:

1. All questions are compulsory.
2. Each question is allotted ONE mark for each correct response.
3. No deduction from the total score will be made if no response is indicated for the question in the answer sheet.
4. There is only ONE correct response for each question. Filling up MORE THAN ONE response in each question will be treated as wrong response.
5. The paper contains 90 questions (Physics 1-30, Chemistry 31-60, Mathematics 61-90 / Biology 61-90).
6. NON-MEDICAL students attempt Physics, Chemistry and Mathematics and MEDICAL Students attempt Physics, Chemistry and Biology.
7. Use of calculators is not allowed.

## Physics

1. A block is kept on the floor of an elevator at rest. The elevator starts descending with an acceleration of $12 \mathrm{~m} / \mathrm{s}^{2}$. Taking $\mathrm{g}=10 \mathrm{~m} / \mathrm{s}^{2}$, find out the displacement of the block during the first 0.2 sec after the start.

(a) 0.04 meter
(b) 0.24 meter
(c) 0.2 meter
(d) 0.02 meter
2. A satellite is orbiting around the earth with a period T. If the earth suddenly shrinks to half its radius without change in mass, the period of revolution of the satellite will be
(a) $\frac{\mathrm{T}}{\sqrt{2}}$
(b) $\frac{\mathrm{T}}{2}$
(c) $\frac{T}{2 \sqrt{2}}$
(d) $\sqrt{2} \mathrm{~T}$
3. Figure shows a siphon. The liquid is water. The pressure difference $P_{B}-P_{A}$ between the points $A$ and $B$ is

(a) $400 \mathrm{Nm}^{-2}$
(b) $3000 \mathrm{Nm}^{-2}$
(c) $1000 \mathrm{Nm}^{-2}$
(d) Zero
4. A motor drives a body along a straight line with a constant force. The power P developed by the motor must vary with time $t$. Identify the correct graph.
(a)

(b)

(c)

(d)

5. In which of the following media will sound travel the fastest?
(a) Solid
(b) Both solid and liquid
(c) Liquid
(d) Gas
6. Error in the measurement of radius of a sphere is $1 \%$. Then error in the volume is
(a) $1 \%$
(b) $5 \%$
(c) $3 \%$
(d) $8 \%$
7. In the equation $S_{n t h}=u+\frac{a}{2}(2 n-1)$, the letters have their usual meanings. The dimensional formula of $\mathrm{S}_{\mathrm{nth}}$ is
(a) $\left[\mathrm{M}^{1} \mathrm{~L}^{0} \mathrm{~T}^{1}\right]$
(b) $\quad\left[\mathrm{M}^{1} \mathrm{~L}^{-1} \mathrm{~T}^{-1}\right]$
(c) $\left[\mathrm{M}^{0} \mathrm{~L}^{1} \mathrm{~T}^{-1}\right]$
(d) $\quad\left[\mathrm{M}^{0} \mathrm{~L}^{1} \mathrm{~T}^{0}\right]$
8. If $\left|\overrightarrow{v_{1}}+\overrightarrow{v_{2}}\right|=\left|\overrightarrow{v_{1}}-\overrightarrow{v_{2}}\right|$ and $\left|\overrightarrow{v_{2}}\right|$ is finite then
(a) $\overrightarrow{v_{1}}$ is parallel to $\overrightarrow{v_{2}}$
(c) $\overrightarrow{v_{1}}=\overrightarrow{v_{2}}$
(c) $\left|\overrightarrow{v_{1}}\right|=\left|\overrightarrow{v_{2}}\right|$
(d) $\overrightarrow{v_{1}}$ and $\overrightarrow{v_{2}}$ is mutually perpendicular
9. Two particles of equal masses are revolving in circular paths of radii $r_{1}$ and $r_{2}$ respectively with the same time period. The ratio of their centripetal force is
(a) $\mathrm{r}_{1} / \mathrm{r}_{2}$
(b) $\sqrt{\mathrm{r}_{2} / \mathrm{r}_{1}}$
(c) $\left(r_{1} / r_{2}\right)^{2}$
(d) $\left(r_{2} / r_{1}\right)^{2}$
10. In which of the following cases, the work done by a gas is minimum?
(I)

(II)

(III)

(IV)

(a) (I)
(b) (II)
(c) (III)
(d) (IV)
11. A carnot engine has an efficiency of $50 \%$ when its sink temperature is $27^{\circ} \mathrm{C}$. What must be the change in its source temperature for making efficiency $60 \%$ ?
(a) 250 K
(b) 200 K
(c) 180 K
(d) 150 K
12. Find the torque of a force $\vec{F}=(-3 \hat{i}+\hat{j}+5 \hat{k}) N$ acting at the point $\vec{r}=(7 \hat{i}+3 \hat{j}+\hat{k}) m$ about the origin
(a) $14 \hat{i}-38 \hat{j}+16 \hat{k}$
(b) $4 \hat{i}+4 \hat{j}+6 \hat{k}$
(c) $-14 \hat{i}+38 \hat{j}-16 \hat{k}$
(d) $-4 \hat{i}-4 \hat{j}-6 \hat{k}$
13. Three particles each of mass $m$ are located at the vertices of an equilateral triangle ABC. They start moving with equal speed $v$ each along the medians of the triangle and collide at its centroid G. If after collision, A comes to rest and B retraces its path along GB, then $C$
(a) also comes to rest
(b) moves with a speed $v$ along CG
(c) moves with a speed $v$ along BG
(d) moves with a speed $v$ along AG

14. A man can swim in still water with a velocity of $10 \mathrm{~km} / \mathrm{h}$, when the water of the river is flowing with some velocity. When the man swims at an angle of $30^{\circ}$ with the normal on the bank of the river, he reaches the point just opposite to the starting point. The velocity of the water of the river is
(a) $10 \mathrm{~km} / \mathrm{h}$
(b) $5 \mathrm{~km} / \mathrm{h}$
(c) $5 \sqrt{2} \mathrm{~km} / \mathrm{h}$
(d) $10 \sqrt{2} \mathrm{~km} / \mathrm{h}$
15. The dimensions of two wires $A$ and $B$ are the same But their materials are different. Their load-extension graphs are shown. If $Y_{A}$ and $Y_{B}$ are the values of Young's modulus of elasticity of $A$ and $B$ respectively, then

(a) $Y_{A}>Y_{B}$
(b) $Y_{A}<Y_{B}$
(c) $Y_{A}=Y_{B}$
(d) $\quad \mathrm{Y}_{\mathrm{B}}=2 \mathrm{Y}_{\mathrm{A}}$
16. In the following given curves the relation between the slopes will be

(a) $\tan \theta_{1}>\tan \theta_{2}$
(b) $\tan \theta_{2}>\tan \theta_{1}$
(c) $\tan \theta_{1}=\tan \theta_{2}$
(d) None of these
17. What will be the value of acceleration due to gravity at the surface of a planet having radius $\left(\frac{1}{4^{t h}}\right)$ to radius of earth and density half of the earth :
(a) $\frac{g}{2}$
(b) 2 g
(c) $\frac{g}{8}$
(d) g
18. A stone is dropped into a well. If the depth of water below the top be $h$ and velocity of sound in air be v , then the time after which splash of sound is heard is
(a) $\sqrt{\frac{2 h}{g}}+\frac{h}{v}$
(b) $\sqrt{\frac{2 h}{g}}-\frac{h}{v}$
(c) $\sqrt{\frac{2 h}{g}}$
(d) $\sqrt{\frac{2 h}{g}} \times \frac{h}{v}$
19. In the relation $\left(\mathrm{P}+\frac{\mathrm{a}}{\mathrm{V}^{2}}\right)(\mathrm{V}-\mathrm{b})=\mathrm{R} \theta$. Where $\mathrm{p}=$ pressure, $\mathrm{V}=$ volume, $\mathrm{R}=$ gas const., $\theta=$ temperature \& a and $b$ are some constant. the dimension of $b$ is
(a) $\mathrm{M}^{\circ} \mathrm{L}^{3} \mathrm{~T}^{\circ}$
(b) $\mathrm{M}^{\circ} \mathrm{L}^{-3} \mathrm{~T}^{\circ}$
(C) $\mathrm{ML}^{2} \mathrm{~T}^{\circ}$
(d) None of these
20. Two force, each numerically equal to 5 N , are acting as shown in the figure. Then the resultant is

(a) 2.5 N
(b) 5 N
(c) $5 \sqrt{3} N$
(d) 10 N
21. An ideal gas of mass $m$ in a state $A$ goes to another state $B$ via three different process as shown in figure. If $Q_{1}, Q_{2}$ and $Q_{3}$ denote the heat absorbed by the gas along the three paths, then

(a) $\mathrm{Q}_{1}<\mathrm{Q}_{2}<\mathrm{Q}_{3}$
(b) $\mathrm{Q}_{1}<\mathrm{Q}_{2}=\mathrm{Q}_{3}$
(c) $\mathrm{Q}_{1}=\mathrm{Q}_{2}>\mathrm{Q}_{3}$
(d) $\mathrm{Q}_{1}>\mathrm{Q}_{2}>\mathrm{Q}_{3}$
22. A particle moves in a circular path with a uniform speed. Its motion is
(a) periodic
(b) oscillatory
(c) simple harmonic
(d) angular simple harmonic
23. Two identical springs, each of spring constant $K$, are connected in series and parallel as shown in figure. A mass $m$ is suspended from them. The ratio of their frequencies of vertical oscillations will be

(a) $2: 1$
(b) $1: 1$
(c) $1: 2$
(d) $4: 1$
24. Which of the following is correct?
(a) A particle moving with constant speed can have variable acceleration
(b) A particle moving with constant velocity can have variable acceleration
(c) If velocity of the particle is zero, acceleration must be zero
(d) If acceleration of the particle is zero, velocity must be zero
25. Two blocks $A$ and $B$ of masses 2 kg and 1 kg rest on a friction less surface. A force of 3 N acts on A as shown in figure. The force exerted by $A$ on $B$ is
(a) 1 N
(b) 3 N
(c) 2 N
(d) Zero

26. $O$ is the centre of an equilateral triangle $A B C . F_{1}, F_{2}$ and $F_{3}$ are the three forces acting along the sides $A B, B C$ and $A C$ respectively. What should be the value of $F_{3}$ so that the total torque about O is zero?
(a) $2\left(\mathrm{~F}_{1}+\mathrm{F}_{2}\right)$
(b) $\frac{\mathrm{F}_{1}+\mathrm{F}_{2}}{2}$
(c) $\mathrm{F}_{1}-\mathrm{F}_{2}$
(d) $\mathrm{F}_{1}+\mathrm{F}_{2}$

27. $V$ versus $T$ curves at constant pressures $P_{1}$ and $P_{2}$ for an ideal gas are shown in figure. Here

(a) $\mathrm{P}_{1}>\mathrm{P}_{2}$
(b) $\mathrm{P}_{1}<\mathrm{P}_{2}$
(c) $\mathrm{P}_{1}=\mathrm{P}_{2}$
(d) $\mathrm{P}_{1} \geq \mathrm{P}_{2}$
28. Consider the processes $A$ and $B$ shows in figure. It is possible that

(a) both the processes are isothermal
(b) both the processes are adiabatic
(c) A is isothermal and B is adiabatic
(d) A is adiabatic and B is isothermal
29. Figure represents two simple harmonic motions


The parameter which has different values in the two motions is
(a) amplitude
(b) frequency
(c) phase
(d) maximum velocity
30. An incompressible liquid travels as shown in figure. The speed of the fluid in the lower branch will be

(a) $1 \mathrm{~ms}^{-1}$
(b) $1.5 \mathrm{~ms}^{-1}$
(c) $2.25 \mathrm{~ms}^{-1}$
(d) $3 \mathrm{~ms}^{-1}$

## Chemistry

31. For a reaction $A+2 B \rightarrow C$, the amount of $C$ formed by starting the reaction with 5 moles of $A$ and 8 moles of $B$ is
(a) 5 moles
(b) 8 moles
(c) 16 moles
(d) 4 moles
32. Which has the maximum number of molecules among the following?
(a) 44 g of $\mathrm{CO}_{2}$
(b) $48 \mathrm{~g} \mathrm{O}_{2}$
(c) $8 \mathrm{~g} \mathrm{H}_{2}$
(d) $64 \mathrm{~g} \mathrm{SO}_{2}$
33. The wave number of the spectral line in the emission spectrum of hydrogen will be equal to 8/ 9 times the Rydberg's constant if the electron jumps from
(a) $n=3$ to $n=1$
(b) $n=10$ to $n=1$
(c) $n=9$ to $n=1$
(d) $n=2$ to $n=1$
34. The following quantum numbers are possible for how may orbitals?

$$
n=3, l=2, m=+2
$$

(a) 1
(b) 2
(c) 3
(d) 4
35. The correct decreasing order first ionization enthalpies of five elements of the second period is
(a) Be $>$ B $>$ C $>$ N $>$ F
(b) $\mathrm{N}>$ F $>$ C $>$ B $>$ Be (c)
$\mathrm{F}>\mathrm{N}>\mathrm{C}>\mathrm{Be}>\mathrm{B}$
(d) F $>$ C $>$ N $>$ B $>$ Be
36. The increasing order of the ionic radii of the given isoelectronic species is
(a) $\mathrm{S}^{2-}, \mathrm{Cl}^{-}, \mathrm{Ca}^{2+}, \mathrm{K}^{+}$
(b) $\mathrm{Ca}^{2+}, \mathrm{K}^{+}, \mathrm{Cl}^{-}, \mathrm{S}^{2-}$
(c) $\mathrm{K}^{+}, \mathrm{S}^{2-}, \mathrm{Ca}^{2+}, \mathrm{Cl}^{-}$
(d) $\mathrm{Cl}^{-}, \mathrm{Ca}^{2+}, \mathrm{K}^{+}, \mathrm{S}^{2-}$
37. The species having bond order different from that in CO is
(a) $\mathrm{NO}^{-}$
(b) $\mathrm{NO}^{+}$
(c) $\mathrm{CN}^{-}$
(d) $\mathrm{N}_{2}$
38. Which of the following is a polar molecule?
(a) $\mathrm{BF}_{3}$
(b) $\mathrm{SF}_{4}$
(c) $\mathrm{SiF}_{4}$
(d) $\mathrm{XeF}_{4}$
39. In order to increase the volume of a gas by $10 \%$, the pressure of the gas should be
(a) decreased by $10 \%$
(b) decreased by $1 \%$
(c) increased by $10 \%$
(d) increased by $1 \%$
40. The density of a gas is $1.964 \mathrm{~g} \mathrm{dm}^{-3}$ at 273 K and 76 cm Hg . The gas is
(a) $\mathrm{CH}_{4}$
(b) $\mathrm{C}_{2} \mathrm{H}_{6}$
(c) $\mathrm{CO}_{2}$
(d) Xe
41. The value of enthalpy change $(\Delta \mathrm{H})$ for the reaction
$\mathrm{C}_{2} \mathrm{H}_{5} \mathrm{OH}(\mathrm{l})+3 \mathrm{O}_{2}(\mathrm{~g}) \rightarrow 2 \mathrm{CO}_{2}(\mathrm{~g})+3 \mathrm{H}_{2} \mathrm{O}(\mathrm{l})$
at $27^{\circ} \mathrm{C}$ is $-1366.5 \mathrm{~kJ} \mathrm{~mol}^{-1}$. The value of internal energy change for the above reaction at this temperature will be
(a) -1371.5 kJ
(b) -1369.0 kJ
(c) $-1364 \cdot 0 \mathrm{~kJ}$
(d) -1361.5 kJ
42. For reaction $2 \mathrm{Cl}(\mathrm{g}) \rightarrow \mathrm{Cl}_{2}(\mathrm{~g})$, the signs of $\Delta \mathrm{H}$ and $\Delta \mathrm{S}$ respectively are
(a) +,-
(b),++
(c) -,-
(d),-+
43. Which one of the following molecular hydrides acts as a Lewis acid?
(a) $\mathrm{CH}_{4}$
(b) $\mathrm{NH}_{3}$
(c) $\mathrm{H}_{2} \mathrm{O}$
(d) $\mathrm{B}_{2} \mathrm{H}_{6}$
44. The hydrogen ion concentration of a $10^{-8} \mathrm{M} \mathrm{HCl}$ aqueous solution at $298 \mathrm{~K}\left(\mathrm{~K}_{\mathrm{w}}=10^{-13}\right)$ is
(a) $9.525 \times 10^{-8} \mathrm{M}$
(b) $1.0 \times 10^{-8} \mathrm{M}$
(c) $1.0 \times 10^{-6} \mathrm{M}$
(d) $1.0525 \times 10^{-7} \mathrm{M}$
45. Which of the following species can function both as oxidising as well as reducing agent?
(a) $\mathrm{Cl}^{-}$
(b) $\mathrm{ClO}_{4}^{-}$
(c) $\mathrm{ClO}^{-}$
(d) $\mathrm{MnO}_{4}^{-}$
46. $\mathrm{Zn}^{2+} \rightarrow \mathrm{Zn}(\mathrm{s}) ; \mathrm{E}^{\circ}=-0.76 \mathrm{~V} \quad \mathrm{Cu}^{2+} \rightarrow \mathrm{Cu}(\mathrm{s}) ; \mathrm{E}^{\circ}=-0.34 \mathrm{~V}$

Which of the following is spontaneous?
(a) $\mathrm{Zn}^{2+}+\mathrm{Cu} \rightarrow \mathrm{Zn}+\mathrm{Cu}^{2+}$
(b) $\mathrm{Cu}^{2+}+\mathrm{Zn} \rightarrow \mathrm{Cu}+\mathrm{Zn}^{2+}$
(c) $\mathrm{Zn}^{2+}+\mathrm{Cu}^{2+} \rightarrow \mathrm{Zn}+\mathrm{Cu}$
(d) none of these
47. The salt responsible for permanent hardness of $\mathrm{H}_{2} \mathrm{O}$ is
(a) $\mathrm{Na}_{2} \mathrm{SO}_{4}$
(b) $\mathrm{Mg}\left(\mathrm{HCO}_{3}\right)_{2}$
(c) NaCl
(d) $\mathrm{MgCl}_{2}$
48. The least stable hydride of 15 th group is
(a) $\mathrm{NH}_{3}$
(b) $\mathrm{PH}_{3}$
(c) $\mathrm{AsH}_{3}$
(d) $\mathrm{BiH}_{3}$
49. The sequence of ionic mobility in aqueous solution is
(a) $\mathrm{Rb}^{+}>\mathrm{K}^{+}>\mathrm{Cs}^{+}>\mathrm{Na}^{+}$
(b) $\mathrm{Na}^{+}>\mathrm{K}^{+}>\mathrm{Rb}^{+}>\mathrm{Cs}^{+}$
(c) $\mathrm{K}^{+}>\mathrm{Na}^{+}>\mathrm{Rb}^{+}>\mathrm{Cs}^{+}$
(d) $\mathrm{Cs}^{+}>\mathrm{Rb}^{+}>\mathrm{K}^{+}>\mathrm{Na}^{+}$
50. Which pair of the following chlorides do not impart colour to the flame?
(a) $\mathrm{BeCl}_{2}$ and $\mathrm{SrCl}_{2}$
(b) $\mathrm{BeCl}_{2}$ and $\mathrm{MgCl}_{2}$
(c) $\mathrm{MgCl}_{2}$ and $\mathrm{CaCl}_{2}$
(d) $\mathrm{BaCl}_{2}$ and $\mathrm{SrCl}_{2}$
51. The stability of +1 oxidation state increases in the sequence
(a) $\mathrm{Ga}<\mathrm{In}<\mathrm{Al}<\mathrm{Tl}$
(b) $\mathrm{Al}<\mathrm{Ga}<\mathrm{In}<\mathrm{Tl}$
(c) $\mathrm{Tl}<\mathrm{In}<\mathrm{Ga}<\mathrm{Al}$
(d) In $<\mathrm{Tl}<\mathrm{Ga}<\mathrm{Al}$
52. The structure of diborane $\left(\mathrm{B}_{2} \mathrm{H}_{6}\right)$ contains
(a) four $2 \mathrm{c}-2 \mathrm{e}$ bonds and two $3 \mathrm{c}-2 \mathrm{e}$ bonds
(b) two $2 \mathrm{c}-2 \mathrm{e}$ bonds and four $3 \mathrm{c}-2 \mathrm{e}$ bonds
(c) two 2c-2e bonds and two 3c-2e bonds
(d) four $2 \mathrm{c}-2 \mathrm{e}$ bonds and four $3 \mathrm{c}-2 \mathrm{e}$ bonds
53. In hexa-1, 3-dien-5-yne, the number of $\mathrm{C}-\mathrm{C}, \sigma, \mathrm{C}-\mathrm{C} \pi$ and $\mathrm{C}-\mathrm{H} \sigma$ bonds respectively are
(a) 5, 4 and 6
(b) 6,3 and 5
(c) 5, 3 and 6
(d) 6, 4 and 5
54. The IUPAC name of the compound $\mathrm{CH}_{3} \mathrm{CH}=\mathrm{CHC} \equiv \mathrm{CH}$ is
(a) Pent-4-yn-2-ene
(b) Pent-3-en-1-yne
(c) Pent-4-en-4-yne
(d) Pent-1-yn-3-ene
55. Which of the following species is not electrophilic in nature?
(a) $\mathrm{Cl}^{+}$
(b) $\mathrm{BH}_{3}$
(c) $\mathrm{H}_{3} \mathrm{O}^{+}$
(d) ${ }^{+} \mathrm{NO}_{2}$
56. Among the following, the alkene on ozonolysis giving rise to only one aldehyde as the product is
(a) But-1-ene
(b) Propane
(c) But-2-ene
(d) 2-Methylprop-1-ene
57. Which of the following compounds will show geometrical isomerism?
(a) cyclohexene
(b) hex-2-ene
(c) hex-3-yne
(d) 1,1-diphenylethylene
58. The alkene that will give the same product with HBr in the absence as well as in the presence of peroxide as
(a) But-2-ene
(b) But-1-ene
(c) propane
(d) hex-1-ene
59. 'White lung cancer' is caused by
(a) asbestos
(b) silica
(c) textiles
(d) paper
60. London smog is found in
(a) Summer during day time
(b) Summer during morning time
(c) Winter during morning time
(d) Summer during day time

## FOR NON-MEDICAL STUDENTS ONLY

## Mathematics

61. In a town of 840 persons, 450 persons read Hindi, 300 read English and 200 read both. Then the number of person who read neither is
(a) 240
(b) 290
(c) 180
(d) 160
62. Let $n(\mathrm{~A})=m$ and $n(\mathrm{~B})=n$. Then the total number of non-empty relations that can be defined from $A$ to $B$ is
(a) $m^{n}$
(b) $n^{m}-1$
(c) $m n-1$
(d) $2^{n n}-1$
63. The domain and range of the real function $f$ defined by $f(x)=\frac{4-x}{x-4}$ is given by
(a) Domain $=$ R, Range $=\{-1,1\}$
(b) Domain $=\mathrm{R}-\{-1\}$, Range $=\mathrm{R}$
(c) Domain $=\mathrm{R}-\{4\}$, Range $=\{-1\}$
(d) Domain $=\mathrm{R}-\{-4\}$, Range $=\{-1,1\}$
64. The value of $\frac{1-\tan ^{2} 15^{\circ}}{1+\tan ^{2} 15^{\circ}}$ is
(a) 1
(b) $\sqrt{3}$
(c) $\frac{\sqrt{3}}{2}$
(d) 2
65. The value of $\tan 3 \mathrm{~A}-\tan 2 \mathrm{~A}-\tan \mathrm{A}$ is equal to
(a) $\tan 3 \mathrm{~A} \tan 2 \mathrm{~A} \tan \mathrm{~A}$
(b) $-\tan 3 \mathrm{~A} \tan 2 \mathrm{~A} \tan \mathrm{~A}$
(c) $\quad \tan \mathrm{A} \tan 2 \mathrm{~A}-\tan 2 \mathrm{~A} \tan 3 \mathrm{~A}-\tan 3 \mathrm{~A} \tan \mathrm{~A}$
(d) None of these
66. The value of $\sin \left(45^{\circ}+\theta\right)-\cos \left(45^{\circ}-\theta\right)$ is
(a) $2 \cos \theta$
(b) $2 \sin \theta$
(c) 1
(d) 0
67. If $\sin \theta+\cos \theta=1$, then the value of $\sin 2 \theta$ is equal to
(a) 1
(b) $1 / 2$
(c) 0
(d) -1
68. If $x^{n}-1$ is divisible by $x-k$, then the least positive value of $k$ is
(a) 1
(b) 2
(c) 3
(d) 4
69. The value of $1+i^{2}+i^{4}+i^{6}+\ldots . .+i^{20}$ is
(a) 1
(b) -1
(c) 0
(d) 2
70. What is the value of $\frac{i^{4 n+1}-i^{4 n-1}}{2}$ ?
(a) 1
(b) $i$
(c) -1
(d) $-i$
71. Given that $x, y$ and $b$ are real numbers $x<y, b<0$, then
(a) $\frac{x}{b}<\frac{y}{b}$
(b) $\frac{x}{b} \leq \frac{y}{b}$
(c) $\frac{x}{b}>\frac{y}{b}$
(b) $\frac{x}{b} \geq \frac{y}{b}$
72. There are 10 lamps in a hall. Each one of them can be switched on independently. Find the number of ways in which the hall can be illuminated.
(a) $2^{10}-1$
(b) $2^{10}$
(c) 10 !
(d) $10^{2}$
73. Every body in a room shakes hands with everybody else. The total number of shakes is 66 . The total number of persons in the room is
(a) 11
(b) 12
(c) 13
(d) 14
74. The total number of terms in the expansion of $(x+a)^{51}-(x-a)^{51}$ after simplification is
(a) 102
(b) 25
(c) 26
(d) None of these
75. If the coefficient of $x^{7}$ and $x^{8}$ in $\left(2+\frac{x}{3}\right)^{n}$ are equal, then $n$ is
(a) 56
(b) 55
(c) 45
(d) 15
76. In an A.P. the $p^{\text {th }}$ term is $q$ and the $(p+q)$ th term is 0 . Then the $q^{\text {th }}$ term is
(a) $-p$
(b) $p$
(c) $p+q$
(d) $p-q$
77. Sum of $1^{2}+2^{2}+3^{2}+\ldots \ldots .+n^{2}$ is
(a) $\frac{n(n+1)(n+2)}{6}$
(b) $\frac{n(n+1)(2 n+1)}{6}$
(c) $\frac{n(n+1)(n-1)}{3}$
(d) $\frac{n(n-1)(n-2)}{3}$
78. Equation of line passing through $(1,2)$ and parallel to the line $y=3 x-1$ is
(a) $y+2=x+1$
(b) $y+2=3(x+1)$
(c) $y-2=3(x-1)$
(d) $y-2=x-1$
79. If $a, b, c$ are in A.P., then the straight line $a x+b y+c=0$ will always pass through
(a) $(1,2)$
(b) $(1,-2)$
(c) $(2,1)$
(d) $(-2,1)$
80. The equation of the circle which passes through the point $(4,5)$ and has its centre at $(2,2)$ is
(a) $(x-2)^{2}+(y-2)^{2}=13$
(b) $(x-2)^{2}+(y-2)^{2}=26$
(c) $\quad(x-2)^{2}+(y+2)^{2}=13$
(d) $(x+2)^{2}+(y+2)^{2}=13$
81. The length of the foot of perpendicular drawn from the point $P(3,4,5)$ on $y$-axis is
(a) 10
(b) $\sqrt{34}$
(c) $\sqrt{113}$
(d) $5 \sqrt{2}$
82. $\lim _{x \rightarrow 0} \frac{\sin x}{x(1+\cos x)}$ is equal to
(a) 0
(b) $\frac{1}{2}$
(c) 1
(d) -1
83. $\lim _{x \rightarrow 0} \frac{|x|}{x}$ is equal to
(a) 1
(b) -1
(c) 0
(d) Does not exist
84. If $f(x)=x \sin x$, then $f^{\prime}\left(\frac{\pi}{2}\right)$ is equal to
(a) 0
(b) 1
(c) -1
(d) $\frac{1}{2}$
85. $\lim _{x \rightarrow \pi} \frac{\sin x}{x-\pi}$ is
(a) 1
(b) 2
(c) -1
(d) $\quad-2$
86. If ${ }^{\mathrm{n}} \mathrm{C}_{12}={ }^{\mathrm{n}} \mathrm{C}_{8}$, then $n$ is equal to
(a) 20
(b) 12
(c) 6
(d) 30
87. The mean deviation of the data $2,9,9,3,6,9,4$ from the mean is
(a) 2.23
(b) 2.57
(c) 3.23
(d) 3.57
88. If the focus of a parabola is $(0,-3)$ and its directrix is $y=3$, then its equation is
(a) $x^{2}=-12 y$
(b) $x^{2}=12 y$
(c) $y^{2}=-12 x$
(d) $y^{2}=12 x$
89. In a non-leap year, the probability of having 53 tuesdays or 53 wednesdays is
(a) $\frac{1}{7}$
(b) $\frac{2}{7}$
(c) $\frac{3}{7}$
(d) None of these
90. A single letter is selected at random from the word 'PROBABILITY'. The probability that it is a vowel is
(a) $\frac{1}{3}$
(b) $\frac{4}{11}$
(c) $\frac{2}{11}$
(d) $\frac{3}{11}$

## FOR MEDICALSTUDENTS ONLY

## Biology

61. As we go from species to kingdom in a taxonomic hierarchy, the number of common characteristics
(a) will decrease
(b) will increase
(c) remain same
(d) may increase or decrease
62. Match the following and choose the correct option:
A. Family
i. tuberosum
B. Kingdom
ii. Polymoniales
C. Order
iii. Solanum
D. Species
iv. Plantae
E. Genus
v. Solanacea

Options
(a) i-D, ii-C, iii-E, iv-B, v-A
(b) i-E, ii-D, iii-B, iv-A, v-C
(c) i-D, ii-E, iii-B, iv-A, v-C
(d) i-E, ii-C, iii-B, iv-A, v-D
63. Difference between Virus and Viroid is
(a) absence of protein coat in viroid but present in virus
(b) presence of low molecular weight RNA in virus but absent in viroid
(c) both (A) and (B)
(d) none of the above
64. A Prothallus is
(a) a structure in pteridophytes formed before the thallus develops.
(b) a sporophytic free living structure formed in pteridophytes.
(c) a gametophyte free living structure formed in pteridophytes.
(d) a primitive structure formed after fertilization in pteridophytes.
65. If the diploid number of a flowering plant is 36 . What would be the chromosome number in its endosperm?
(a) 36
(b) 18
(c) 54
(d) 72
66. Which of the following pairs of animals has non glandular skin?
(a) Snake and Frog
(b) Chameleon and Turtle
(c) Frog and Pigeon
(d) Crocodile and Tiger
67. Which one of the following statements is incorrect?
(a) Mesoglea is present in between ectoderm and endoderm in Obelia.
(b) Radial symmetry is found in Asterias
(c) Fasciola is a pseudocoelomate animal
(d) Taenia is a triploblastic animal
68. Phylum $\qquad$ have two different types of symmetry "Radial \& bilateral".
(a) Coelenterata
(b) Platyhelminthes
(c) Nematoda
(d) Echinodermata
69. Body cavity is the cavity present between body wall and gut wall. In some animals the body cavity is not lined by mesoderm. Such animals are called
(a) Acoelomate
(b) Pseudocoelomate
(c) Coelomate
(d) Haemocoelomate
70. Rearrange the following zones as seen in the root in vertical section and choose the correct option.
A. Root hair zone
B. Zone of meristems
C. Rootcap zone
D. Zone of maturation
E. Zone of elongation

Options:
(a) C, B, E, A, D
(b) A, B, C, D, E
(c) D, E, A, C, B
(d) $\mathrm{E}, \mathrm{D}, \mathrm{C}, \mathrm{B}, \mathrm{A}$
71. The protoplasmic strands connecting the two adjacent plant cells through which exchange of material occur are called
(a) Plasmalemma
(b) Plasmodesmata
(c) Tonofibrils
(d) Spindle fibers
72. In cockroach, the excretory organs are Malpighian tubules. They are found on the
(a) Distal region of mid gut
(b) Proximal region of mid gut
(c) Proximal region of hind gut
(d) Junction of mid gut and hind gut
73. Which of the following is an anticoagulant and checks blood coagulation in blood vessels?
(a) Prothrombin
(b) Globulin
(c) Thromboplastin
(d) Heparin
74. The oblique cross connections to form a contractile network of fibers and the intercalated discs are characteristically found in
(a) Striated muscle
(b) Unstriated muscle(C)
Cardiac muscle
(d) Radial muscle
75. Go through the following statement.
(i) The cambium is generally more active on the inner side than on the outer.
(ii) The autumn wood is darker and has a higher density than spring wood.
(iii) In stem, the secondary xylem shows distinction into protoxylem and metaxylem and occurs in the form of patches.
(iv) The tracheids and vessels of the sapwood get plugged by the ingrowth of the adjacent parenchyma cells into their cavities, called tyloses.

Which of these are correct?
(a) (i), (ii) \& (iii)
(b) (i), (ii) \& (iv)
(c) (i) $\&$ (ii)
(d) (i), (iii) \& (iv)
76. Pericycle in roots is never thick and sclerenchymatous because
(a) It does not act as mechanical tissue in roots.
(b) It gives rise to root hair
(c) It is place of origin of lateral roots
(d) It gives rise both to root hairs and root branches
77. Coleoptile and coleorhiza are protective coverings in maize grain. Which is true?
(a) Coleorhiza is a covering of plumule
(b) Coleoptile is covering of radicle
(c) Coleoptile is covering of plumule
(d) Coleorhiza is covering of endosperm
78. If a plant bears unisexual, bisexual and even neutral flowers, it is called
(a) Bisexual
(b) Polygamous
(c) Bigamous
(d) Monoecious
79. Lateral line system found in fishes has been lost in Amphibia because of
(a) Development of sturdy legs
(b) Change over to herbivorous feeding
(c) Occurrence of metamorphosis in Amphibia
(d) Evolution to terrestrial habitat
80. Body having meshwork of cells, internal cavities lined with food filtering flagellated cells and indirect development are the characteristic features of phylum
(a) Coelenterata
(b) Porifera
(c) Mollusca
(d) protozoa
81. Thorns of Bougainvillea and tendrils of Cucurbita shows
(a) Homology
(b) Analogy
(c) Adaptive radiation(d) Atavism
82. Viruses have
(a) DNA core, Lipid coat
(b) DNA or RNA core, Protein coat
(c) DNA or RNA core, Plasma membrane
(d) DNA containing nucleus, lipid envelope
83. In Lichens, algal component is known as
(a) Mycobiont
(b) Phycobiont
(c) Schizont
(d) Heterocyst
84. The outer covering of cartilage is called as
(a) Peritoneum
(b) Periosteum
(c) Endosteum
(d) Perichondrium
85. Arteries have
(a) thick wall, narrow lumen
(b) thick wall, broad lumen
(c) thin wall, broad lumen
(d) thin wall, narrow lumen
86. Enzymes are biocatalysts. They
(a) increase the rate of biochemical reaction, decrease the activation energy
(b) increase the rate of biochemical reaction, increase the activation energy
(c) decrease the rate of biochemical reaction, increase the activation energy
(d) decrease the rate of biochemical reaction, decrease the activation energy
87. When the margins of sepals or petals overlap one another without any particular direction, the condition is termed as
(a) imbricate
(b) twisted
(c) valvate
(d) vexillary
88. When a fresh water protozoan is placed in marine water
(a) contractile vacuole disappears
(b) contractile vacuole increases in size
(c) a number of contractile vacuoles appear
(d) the contractile vacuole remains unchanged
89. DNA replication in bacteria occurs
(a) within nuclelous
(b) prior to fission
(c) just before transcription
(d) during S phase
90. On hydrolysis, Nucleoside does not yield
(a) Phosphoric acid
(b) Pentose sugar
(c) Purine
(d) Pyrimidine

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