iQuest Scholarship Cum Admission Test

SAMPLE PAPER
FOR CLASS 12th (NM)

Test ID : .....

Time : 1.5 hrs. **M. Marks: 180**

SYLLABUS & SCHEME		
SUBJECTS	**Qs.**	**SYLLABUS**
PHYSICS	15	XII Syllabus
CHEMISTRY	15	XII Syllabus
BIOLOGY (BOTANY + ZOOLOGY)	15	XII Syllabus

INSTRUCTIONS TO CANDIDATE

- Each subject in this paper consists of multiple choice questions with only one correct answer. ***+4 marks*** will be awarded for correct answer and ***–1 mark*** for wrong answer.
- Please read the instructions given for each question carefully and fill the correct answer against the question numbers on the answer sheet in the respective subject.
- **Use blue or black ball point pen to darken the appropriate circle & mark should completely fill the circle.**
- The Question paper contains blank spaces for your rough work. No additional sheet will be provided for rough work.
- Blank papers, Clipboards, Log Tables, Slide rule, Calculators, Cellular phones, Pagers and Electronic gadgets in any form are not allowed.
- Write your Name, Student ID in the block at the top of the Answer Sheet. Also write your Name & Student ID in the space provided on this cover page of question paper.

Name:_____**Student ID**_____

PHYSICS

1. The equation of state of a real gas is given by $\left(P+\frac{a}{V^2}\right)(V-b)=RT$, where P, V and T are pressure. volume and temperature respectively and R is the universal gas constant. The dimensions of $\frac{a}{b^2}$ is similar to that of :

(1) PV

(2) P

(3) RT

(4) R

2. Wheatstone bridge principle is used to measure the specific resistance (S_1) of given wire, having length L, radius r. If X is the resistance of wire, then specific resistance is : $S_1 = X\left(\frac{\pi r^2}{L}\right)$. If the length of the wire gets doubled then the value of specific resistance will be :

(1) $\frac{S_1}{4}$

(2) $2S_1$

(3) $\frac{S_1}{2}$

(4) S_1

3. Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : The angular speed of the moon in its orbit about the earth is more than the angular speed of the earth in its orbit about the sun.

Reason (R) : The moon takes less time to move around the earth than the time taken by the earth to move around the sun.

In the light of the above statements, choose the most appropriate answer from the options given below :

(1) (A) is correct but (R) is not correct

(2) Both (A) and (R) are correct and (R) is the correct explanation of (A)

(3) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

(4) (A) is not correct but (R) is correct

4. Given below are two statements :

Statement (I) : The limiting force of static friction depends on the area of contact and independent of materials.

Statement (II) : The limiting force of kinetic friction is independent of the area of contact and depends on materials.

In the light of the above statements, choose the most appropriate answer from the options given below :

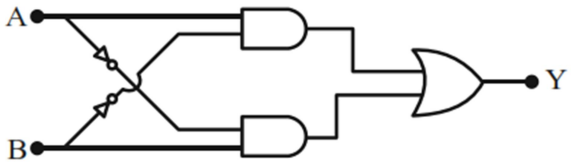
(1) Statement I is correct but Statement II is incorrect

(2) Statement I is incorrect but Statement II is correct

(3) Both Statement I and Statement II are incorrect

(4) Both Statement I and Statement II are correct

5. The truth table of the given circuit diagram is :



(1)

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1

(2)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

(3)

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

(4)

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

6. A current of 200 μA deflects the coil of a moving coil galvanometer through 60^0. The current to cause deflection through $\frac{\pi}{10}$ radian is :

(1) 30 μA (2) 120 μA

(3) 60 μA (4) 180 μA

7. The atomic mass of ${}_6C^{12}$ is 12.000000 u and that of ${}_6C^{13}$ is 13.003354 u. The required energy to remove a neutron from ${}_6C^{13}$, if mass of neutron is 1.008665 u, will be :

(1) 62. 5 MeV (2) 6.25 MeV

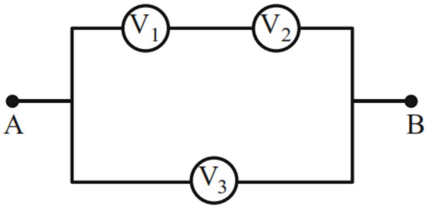
(3) 4.95 MeV (4) 49.5 MeV

8. A ball suspended by a thread swings in a vertical plane so that its magnitude of acceleration in the extreme position and lowest position are equal. The angle (θ) of thread deflection in the extreme position will be :

(1) $\tan^{-1}\left(\sqrt{2}\right)$ (2) $2\tan^{-1}\left(\frac{1}{2}\right)$

(3) $\tan^{-1}\left(\frac{1}{2}\right)$ (4) $2\tan^{-1}\left(\frac{1}{\sqrt{5}}\right)$

9. Three voltmeters, all having different internal resistances are joined as shown in figure. When some potential difference is applied across A and B, their readings are V_1, V_2 and V_3. Choose the correct option.



(1) $V_1 = V_2$ (2) $V_1 \neq V_3 - V_2$

(3) $V_1 + V_2 > V_3$ (4) $V_1 + V_2 = V_3$

10. The total kinetic energy of 1 mole of oxygen at 27°C is :

[Use universal gas constant (R)= 8.31 J/mole K]

(1) 6845.5 J (2) 5942.0 J

(3) 6232.5 J (4) 5670.5J

11. Given below are two statements : one is labelled as Assertion(A) and the other is labelled as Reason (R).

Assertion (A) : In Vernier calliper if positive zero error exists, then while taking measurements, the reading taken will be more than the actual reading.

Reason (R) : The zero error in Vernier Calliper might have happened due to manufacturing defect or due to rough handling.

In the light of the above statements, choose the correct answer from the options given below :

(1) Both (A) and (R) are correct and (R) is the correct explanation of (A)

(2) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

(3) (A) is true but (R) is false

(4) (A) is false but (R) is true

12. Primary side of a transformer is connected to 230 V, 50 Hz supply. Turns ratio of primary to secondary winding is 10 : 1. Load resistance connected to secondary side is 46 Ω. The power consumed in it is :

(1) 12.5 W (2) 10.0 W

(3) 11.5 W (4) 12.0 W

13. During an adiabatic process, the pressure of a gas is found to be proportional to the cube of its absolute temperature. The ratio of $\frac{C_p}{C_v}$ for the gas is :

(1) $\frac{5}{3}$ (2) $\frac{3}{2}$

(3) $\frac{7}{5}$ (4) $\frac{9}{7}$

14. The threshold frequency of a metal with work function 6.63 eV is :

(1) 16×10^{15} Hz

(2) 16×10^{12} Hz

(3) 1.6×10^{12} Hz

(4) 1.6×10^{15} Hz

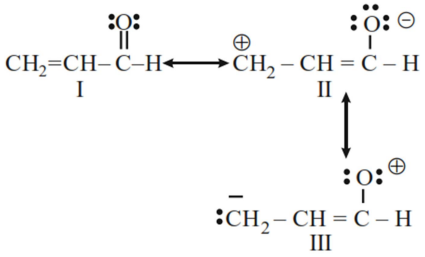
15. The ratio for the speed of the electron in the 3rd orbit of He^+ to the speed of the electron in the 3rd orbit of hydrogen atom will be :-

(A) 1 : 1 (B) 1 : 2

(C) 4 : 1 (D) 2 : 1

CHEMISTRY

16. The order of relative stability of the contributing structure is:



I II III

Choose the **correct** answer from the options given below:

(1) I > II > III

(2) II > I > III

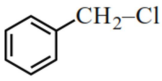
(3) I = II = III

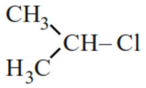
(4) III > II > I

17. Which among the following halide/s will not show S_N1 reaction:

(A) $H_2C = CH - CH_2Cl$

(B) $CH_3 - CH = CH - Cl$

(C) 

(D) 

Choose the **most appropriate** answer from the options given below:

(1) (A), (B) and (D) only
(2) (A) and (B) only
(3) (B) and (C) only
(4) (B) only

18. Which of the following statements is not correct about rusting of iron?

(1) Coating of iron surface by tin prevents rusting, even if the tin coating is peeling off.
(2) When pH lies above 9 or 10, rusting of iron does not take place.
(3) Dissolved acidic oxides SO_2, NO_2 in water act as catalyst in the process of rusting.
(4) Rusting of iron is envisaged as setting up of electrochemical cell on the surface of iron object.

19. Given below are two statements:

Statement (I) : In the Lanthanoids, the formation of Ce^{+4} is favoured by its noble gas configuration.

Statement (II) : Ce^{+4} is a strong oxidant reverting to the common +3 state.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Statement I is false but Statement II is true
(2) Both Statement I and Statement II are true
(3) Statement I is true but Statement II is false
(4) Both Statement I and Statement II are false

20. Choose the correct option having all the elements with d^{10} electronic configuration from the following:

(1) ^{27}Co, ^{28}Ni, ^{26}Fe, ^{24}Cr
(2) ^{29}Cu, ^{30}Zn, ^{48}Cd, ^{47}Ag
(3) ^{46}Pd, ^{28}Ni, ^{26}Fe, ^{24}Cr
(4) ^{28}Ni, ^{24}Cr, ^{26}Fe, ^{29}Cu

21. Phenolic group can be identified by a positive:

(1) Phthalein dye test
(2) Lucas test
(3) Tollen's test
(4) Carbylamine test

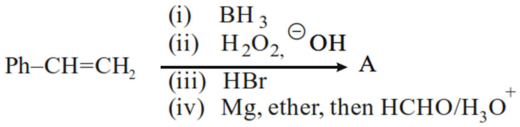
22. The molecular formula of second homologue in the homologous series of mono carboxylic acids is _____.

(1) $C_3H_6O_2$
(2) $C_2H_4O_2$
(3) CH_2O
(4) $C_2H_2O_2$

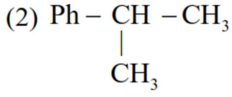
23. The technique used for purification of steam volatile water immiscible substance is:

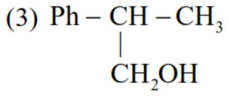
(1) Fractional distillation
(2) Fractional distillation under reduced pressure
(3) Distillation
(4) Steam distillation

24. The final product A, formed in the following reaction sequence is:



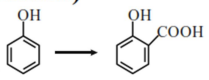
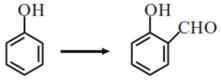
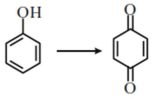
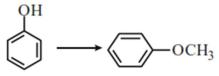
(1) $Ph - CH_2 - CH_2 - CH_3$

(2) 

(3) 

(4) $Ph - CH_2 - CH_2 - CH_2 - OH$

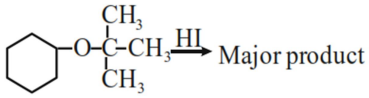
25. Match List-I with List-II.

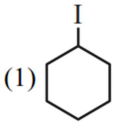
List – I (Reaction)	**List – II (Reagent(s))**
(A) 	(I) $Na_2Cr_2O_7$, H_2SO_4
(B) 	(II) (i) NaOH (ii) CH_3Cl
(C) 	(III) (i) NaOH, $CHCl_3$ (ii) NaOH (iii) HCl
(D) 	(IV) (i) NaOH (ii) CO_2 (iii) HCl

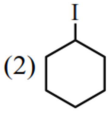
Choose the correct answer from the options given below:

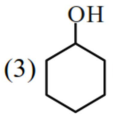
(1) (A)-(IV), (B)-(I), (C)-(III), (D)-(II)
(2) (A)-(II), (B)-(III), (C)-(I), (D)-(IV)
(3) (A)-(II), (B)-(I), (C)-(III), (D)-(IV)
(4) (A)-(IV), (B)-(III), (C)-(I), (D)-(II)

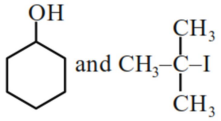
26. Major product formed in the following reaction is a mixture of:



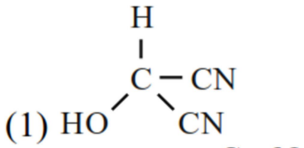
(1)  and $(CH_3)_3CI$

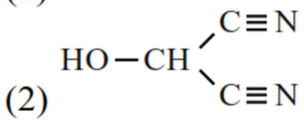
(2)  and $(CH_3)_3COH$

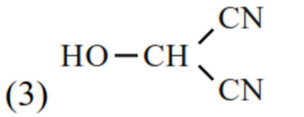
(3)  and $(CH_3)_3COH$

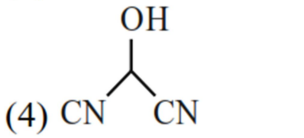
(4)  and $CH_3-\underset{CH_3}{\overset{CH_3}{C}}-I$

27. Bond line formula of $HOCH(CN)_2$ is:

(1) 

(2) 

(3) 

(4) 

28. Given below are two statements:

Statement (I) : Oxygen being the first member of group 16 exhibits only –2 oxidation state.

Statement (II) : Down the group 16 stability of +4 oxidation state decreases and +6 oxidation state increases.

In the light of the above statements, choose the **most appropriate** answer from the options given below:

(1) Statement I is correct but Statement II is incorrect

(2) Both Statement I and Statement II are correct

(3) Both Statement I and Statement II are incorrect

(4) Statement I is incorrect but Statement II is correct

29. Identify from the following species in which d^2sp^3 hybridization is shown by central atom:

(1) $[Co(NH_3)_6]^{3+}$

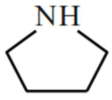
(2) BrF_5

(3) $[Pt(Cl)_4]^{2-}$

(4) SF_6

30. Identify B formed in the reaction.

$$Cl-(CH_2)_4-Cl \xrightarrow{\text{excess } NH_3} A \xrightarrow{NaOH} B + H_2O + NaCl$$

(1) 

(2) $H_2N-(CH_2)_4-NH_2$

(3) $Cl\overset{+}{N}H_3-(CH_2)_4-\overset{+}{N}H_3Cl^-$

(4) 

MATHEMATICS

31. Considering only the principal values of inverse trigonometric functions, the number of positive real values of x satisfying $\tan^{-1}(x)+\tan^{-1}(2x)=\frac{\pi}{4}$ is :

(1) More than 2

(2) 1

(3) 2

(4) 0

32. Consider the function $f:(0,2)\to R$ defined by $f(x)=\frac{x}{2}+\frac{2}{x}$ and the function g(x) defined by $g(x)=\begin{cases}\min\{f(t)\}, & 0<t\le x \text{ and } 0<x\le 1\\ \frac{3}{2}+x, & 1<x<2\end{cases}$. Then

(1) g is continuous but not differentiable at x = 1

(2) g is not continuous for all $x\in(0,2)$

(3) g is neither continuous nor differentiable at x = 1

(4) g is continuous and differentiable for all $x\in(0,2)$

33. Let the image of the point (1, 0, 7) in the line $\frac{x}{1}=\frac{y-1}{2}=\frac{z-2}{3}$ be the point (α, β, γ). Then which one of the following points lies on the line passing through (α, β, γ) and making angles $\frac{2\pi}{3}$ and $\frac{3\pi}{4}$ with y-axis and z-axis respectively and an acute angle with x-axis ?

(1) $\left(1,-2,1+\sqrt{2}\right)$

(2) $\left(1,2,1-\sqrt{2}\right)$

(3) $\left(3,4,3-2\sqrt{2}\right)$

(4) $\left(3,-4,3+2\sqrt{2}\right)$

34. Let R be the interior region between the lines $3x-y+1=0$ and $x+2y-5=0$ containing the origin. The set of all values of a, for which the points $(a^2, a+1)$ lie in R, is :

(1) $(-3,-1)\cup\left(-\frac{1}{3},1\right)$

(2) $(-3,0)\cup\left(\frac{1}{3},1\right)$

(3) $(-3,0)\cup\left(\frac{2}{3},1\right)$

(4) $(-3,-1)\cup\left(\frac{1}{3},1\right)$

35. The 20^{th} term from the end of the progression $20,19\frac{1}{4},18\frac{1}{2},17\frac{3}{4},....,-129\frac{1}{4}$ is :-

(1) –118

(2) –110

(3) –115

(4) –100

36. Let $f:R-\left\{\frac{-1}{2}\right\}\to R$ and $g:R-\left\{\frac{-5}{2}\right\}\to R$ be defined as $f(x)=\frac{2x+3}{2x+1}$ and $g(x)=\frac{|x|+1}{2x+5}$. Then the domain of the function fog is :

(1) $R-\left\{-\frac{5}{2}\right\}$

(2) R

(3) $R-\left\{-\frac{7}{4}\right\}$

(4) $R-\left\{-\frac{5}{2},-\frac{7}{4}\right\}$

37. For $0 < a < 1$, the value of the integral $\int_0^{\pi}\frac{dx}{1-2a\cos x+a^2}$ is :

(1) $\frac{\pi^2}{\pi+a^2}$

(2) $\frac{\pi^2}{\pi-a^2}$

(3) $\frac{\pi}{1-a^2}$

(4) $\frac{\pi}{1+a^2}$

38. Let $g(x)=3f\left(\frac{x}{3}\right)+f(3-x)$ and $f''(x)>0$ for all $x\in(0,3)$. If g is decreasing in (0, α) and increasing in (α, 3), then 8α is

(1) 24

(2) 0

(3) 18

(4) 20

39. If $\lim\limits_{x\to0}\frac{3+\alpha\sin x+\beta\cos x+\log_e(1-x)}{3\tan^2 x}=\frac{1}{3}$, then $2\alpha-\beta$ is equal to :

(1) 2

(2) 7

(3) 5

(4) 1

40. If α, β are the roots of the equation, $x^2 - x - 1 = 0$ and $S_n = 2023\alpha^n + 2024\beta^n$, then

(1) $2S_{12} = S_{11} + S_{10}$

(2) $S_{12} = S_{11} + S_{10}$

(3) $2S_{11} = S_{12} + S_{10}$

(4) $S_{11} = S_{10} + S_{12}$

41. Let A and B be two finite sets with m and n elements respectively. The total number of subsets of the set A is 56 more than the total number of subsets of B. Then the distance of the point P(m, n) from the point Q(–2, –3) is

(1) 10

(2) 6

(3) 4

(4) 8

42. The values of α, for which

$$\begin{vmatrix} 1 & \frac{3}{2} & \alpha+\frac{3}{2} \\ 1 & \frac{1}{3} & \alpha+\frac{1}{3} \\ 2\alpha+3 & 3\alpha+1 & 0 \end{vmatrix} = 0$$, lie in the interval

(1) (–2, 1)

(2) (–3, 0)

(3) $\left(-\frac{3}{2}, \frac{3}{2}\right)$

(4) (0, 3)

43. An urn contains 6 white and 9 black balls. Two successive draws of 4 balls are made without replacement. The probability, that the first draw gives all white balls and the second draw gives all black balls, is :

(1) $\frac{5}{256}$ (2) $\frac{5}{715}$

(3) $\frac{3}{715}$ (4) $\frac{3}{256}$

44. The integral $\int \frac{(x^8 - x^2)dx}{(x^{12} + 3x^6 + 1)\tan^{-1}\left(x^3 + \frac{1}{x^3}\right)}$ is equal to :

(1) $\log_e\left(\left|\tan^{-1}\left(x^3 + \frac{1}{x^3}\right)\right|\right)^{1/3} + C$

(2) $\log_e\left(\left|\tan^{-1}\left(x^3 + \frac{1}{x^3}\right)\right|\right)^{1/2} + C$

(3) $\log_e\left(\left|\tan^{-1}\left(x^3 + \frac{1}{x^3}\right)\right|\right) + C$

(4) $\log_e\left(\left|\tan^{-1}\left(x^3 + \frac{1}{x^3}\right)\right|\right)^{3} + C$

45. If $2\tan^2\theta - 5\sec\theta = 1$ has exactly 7 solutions in the interval $\left[0, \frac{n\pi}{2}\right]$, for the least value of $n \in N$ then $\sum_{k=1}^{n} \frac{k}{2^k}$ is equal to :

(1) $\frac{1}{2^{15}}(2^{14} - 14)$

(2) $\frac{1}{2^{14}}(2^{15} - 15)$

(3) $1 - \frac{15}{2^{13}}$

(4) $\frac{1}{2^{13}}(2^{14} - 15)$

ANSWER KEY

1.	B	2.	D	3.	B	4.	B
5.	B	6.	C	7.	C	8.	B
9.	D	10.	C	11.	B	12.	C
13.	B	14.	D	15.	D	16.	A
17.	D	18.	A	19.	B	20.	B
21.	A	22.	B	23.	D	24.	D
25.	D	26.	D	27.	D	28.	C
29.	A	30.	B	31.	B	32.	A
33.	C	34.	B	35.	C	36.	A
37.	C	38.	C	39.	C	40.	B
41.	A	42.	B	43.	C	44.	A
45.	D						