Reliable INSTITUTE
(A Unit of ALLEN Career Institute)

# R-NET(2021)

**(Reliable National Entrance Test)**

## ACADEMIC SESSION : 2021-22

## SAMPLE TEST PAPER (For XI to XII Moving)

**Duration : 18 Min.** **Max. Marks : 96**

**Name :** _____ **Application Form Number** _____

**Reg. Number :** | 2 | 0 | | | | | | | | | | |

### GENERAL INSTRUCTIONS

1. There are **07** pages in the booklet containing 24 questions of **Physics (1 to 8), Chemistry (9 to 16), Mathematics(17 to 24)** each question carries 4 mark.
2. Blank papers, clip boards, log tables, slide rule, calculators, mobile or any other electronic gadgets in any form is not allowed.
3. Write your Name and Roll No. in the space provided at the top of this booklet.
4. Before answering the paper, fill up the required details in the blank space provided in the answer sheet.
5. Do not forget to mention your roll number neatly and clearly in the blank space provided in the answer sheet.
6. No rough sheets will be provided by the invigilators. All the rough work is to be done in the blank space provided in the question paper.
7. In case of any dispute, the answer filled in the OMR sheet available with the institute shall be final.

DO NOT BREAK THE SEALS WITHOUT BEING INSTRUCTED TO DO SO BY THE INVIGILATOR

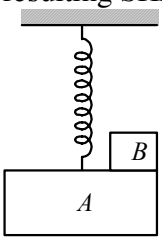
### MARKING CRITERIA

| No. of Questions | Type | Marks | | |
|---|---|---|---|---|
| | | Correct | Incorrect | Blank |
| 1-24 | Only one correct | Q.No. 1 to 24 (4 Mark each) | –1 negative marks | 0 |

# PHYSICS

**This section contains 8 multiple choice questions. Each question has four choices (1), (2), (3) and (4) out of which only one is correct**

**1.** A block $A$ of mass 2 kg is hanging in a vertical plane with a spring of stiffness constant $k$ = 100 N/m. A block B of mass 1 kg is kept on block $A$ and the system is in equilibrium. Suddenly block $B$ is removed. The amplitude of resulting SHM of $A$ is



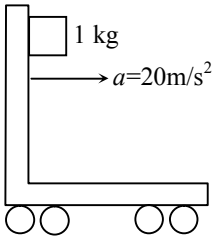

(1) 5 cm (2) 10 cm (3) 15 cm (4) 20 cm

**2.** A particle is moving east-wards with a velocity of 4 m/s. In 10 seconds the velocity changes to 3 m/s northwards. The average acceleration in this time interval is

(1) $\frac{1}{2}$ m/s$^2$ towards north-east (2) $\frac{1}{\sqrt{2}}$ m/s$^2$ towards north-west

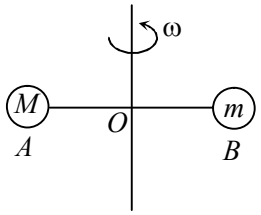
(3) $\frac{1}{\sqrt{2}}$ m/s$^2$ towards north-east (4) $\frac{1}{2}$ m/s$^2$ towards north-west

**3.** A block of mass 1 kg just remains in equilibrium with the vertical wall of a cart accelerating uniformly with 20 m/s$^2$ as shown. The co-efficient of friction between block and wall is ($g$ = 10 m/s$^2$)




(1) 0.1 (2) 0.2 (3) 0.5 (4) 1

**4.** Two balls of mass $M$ = 9 g and $m$ = 3 g are attached by massless threads $AO$ and $OB$. The length $AB$ is 1 m. They are set in rotational motion in a horizontal plane about a vertical axis at $O$ with constant angular velocity ω. The ratio of length $AO$ and $OB$ $\left(\frac{AO}{OB}\right)$ for which the tension in threads are same will be

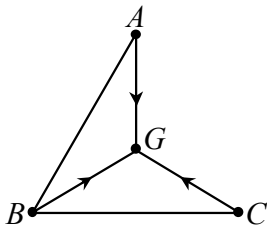



(1) $\frac{1}{3}$ (2) 3 (3) $\frac{2}{3}$ (4) $\frac{3}{2}$

**5.** A bob is suspended from a crane by a cable of length $l = 5$ m. The crane and the bob are moving at a constant speed $v_0$. The crane is stopped by a bumper and the bob on the cable swings out an angle of 60°. The initial speed $v_0$ is ($g = 9.8$ m/s$^2$)

(1) 10 m/s (2) 7 m/s (3) 4 m/s (4) 2 m/s

**6.** Three particles $A$, $B$ and $C$ of equal mass, move with equal speed $v$ along the medians of an equilateral triangle as shown in the figure. They collide at the centroid $G$ of the triangle. After collision, $A$ comes to rest and $B$ retraces its path with speed $v$. What is the speed of $C$ after collision?

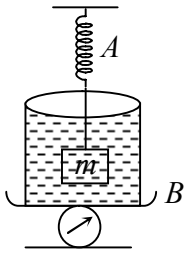



(1) 0 (2) $\frac{v}{2}$ (3) $v$ (4) $2v$

**7.** Two trains, one coming towards and another going away from an observer both at 4 m/s produce a whistle simultaneously of frequency 300 Hz. The number of beats heard by observer will be (velocity of sound = 340 m/s)

(1) 5 (2) 6 (3) 7 (4) 12

**8.** The spring balance $A$ reads 2 kg with a block $m$ suspended from it. A balance $B$ reads 5 kg when a beaker with liquid is put on the pan of the balance. The two balances are now so arranged that the hanging mass is inside the liquid in the beaker as shown in figure. In this situation




(1) the balance $A$ will read more than 2 kg

(2) the balance $B$ will read less than 5 kg

(3) the balance $A$ will read less than 2 kg

(4) the balance $A$ and $B$ will read 2 kg and 5 kg respectively

# CHEMISTRY

**This section contains 8 multiple choice questions. Each question has four choices (1), (2), (3) and (4) out of which only one is correct**

**9.** One mole of an ideal diatomic gas ($C_V$ = 5 cal) was transformed from initial state 25°C and 1 L to the state when temperature is 100°C and volume 10 L. Then for this process(R = 2 calorie/mol/K) (take calorie as unit of energy and kelvin for temp) change in entropy of system will be

(1) 525

(2) $5 \ln \frac{373}{298} + 2 \ln 10$

(3) 625

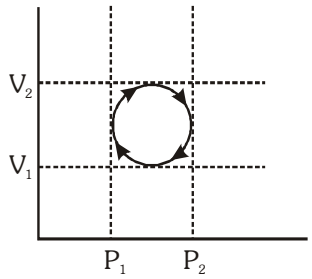
(4) $\Delta S$ of the process can not be calculated using given information.

**10.** $A(g) + 2B(g) \rightleftharpoons 2C(g)$ is an endothermic reaction. The amount of C formed will be less if

(1) T is increased and P is decreased (2) T is decreased and P is increased

(3) T is decreased and P is decreased (4) T is increased and P is increased

**11.** In the cyclic process shown in P - V diagrame, the magnitude of work done is–




(1) $\pi\left(\frac{P_2 - P_1}{2}\right)^2$ (2) $\pi\left(\frac{V_2 - V_1}{2}\right)^2$

(3) $\frac{\pi}{4}(P_2 - P_1)(V_2 - V_1)$ (4) $\pi(V_2 - V_1)^2$

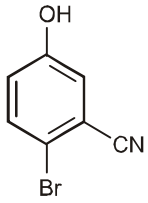
**12.** A dye absorbs a photon of wavelength $\lambda$ and re-emits the same energy into two photons of wavelengths $\lambda_1$ and $\lambda_2$ respectively. The wavelength $\lambda$ is related with $\lambda_1$ and $\lambda_2$ as :

(1) $\lambda = \frac{\lambda_1 + \lambda_2}{\lambda_1 \lambda_2}$ (2) $\lambda = \frac{\lambda_1 \lambda_2}{\lambda_1 + \lambda_2}$ (3) $\lambda = \frac{\lambda_1^2 + \lambda_2^2}{\lambda_1 + \lambda_2}$ (4) $\lambda = \frac{\lambda_1 \lambda_2}{(\lambda_1 + \lambda_2)^2}$

**13.** A mixture of $SO_3$, $SO_2$ and $O_2$ gases is maintained at equilibrium in 10 L flask at a temperatute at which $K_c$ for the reaction $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$ is 100 $mol^{-1}$ litre. At equilibrium if number of moles of $SO_3$ in flask are twice the no of moles of $SO_2$ then how many moles of $O_2$ present at equilibrium.

(1) 0.2 mole (2) 0.6 mole (3) 0.8 mole (4) 0.4 mole

**14.** The IUPAC name of the following compound is :



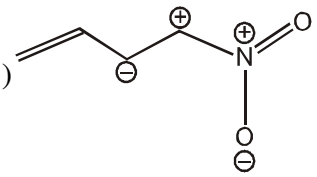

(1) 4-Bromo-3-cyanophenol

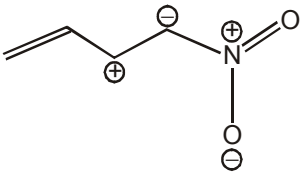
(2) 2-Bromo-5-hydroxybenzonitrile

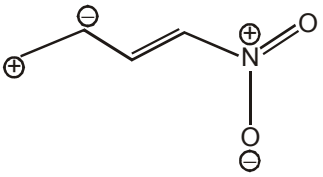
(3) 2-Cyano-4-hydroxybromobenzene

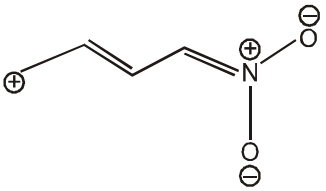
(4) 6-Bromo-3-hydroxybenzonitrile

**15.** Among the following, the least stable resonating structure is :

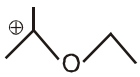
(1) 

(2) 

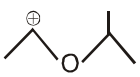
(3) 

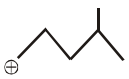
(4) 

**16.** The correct stability order for the following species is :


(I)


(II)


(III)


(IV)

(1) (II) > (IV) > (I) > (III)

(2) (I) > (II) > (III) > (IV)

(3) (II) > (I) > (IV) > (III)

(4) (I) > (III) > (II) > (IV)

# MATHEMATICS

**This section contains 8 multiple choice questions. Each question has four choices (1), (2), (3) and (4) out of which only one is correct**

**17.** The complete interval of x satisfying $\frac{x^2+x+1}{|x+2|}>0$ is :

(1) $x \in (-\infty, -2) \cup (2, \infty)$ (2) $x \in (-\infty, -2) \cup (-2, \infty)$

(3) $x \in (-\infty, -2) \cup (0, \infty)$ (4) $x \in R$

**18.** Given the family of lines $m(3x - 2y - 1) + n(x + 3y + 7) = 0$. The member of the family which makes a triangle of least area with co-ordiante axes in third quadrant is :

(1) $x - 2y - 3 = 0$ (2) $x + 3y + 7 = 0$

(3) $2x + y + 4 = 0$ (4) None of these

**19.** If $f(x) = \sin^4 x + \cos^4 x - \frac{1}{2}\sin 2x$ then the range of f(x) is

(1) $\left[0, \frac{3}{2}\right]$ (2) $\left[-\frac{1}{2}, \frac{7}{2}\right]$ (3) $\left[0, \frac{9}{8}\right]$ (4) $\left[\frac{3}{4}, \frac{7}{8}\right]$

**20.** If the angles of $\Delta ABC$ are in the ratio 1 : 2 : 3, then the corresponding sides are as

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

**21.** The sum of coefficients of even powers of x in the expansion of $\left(x + \frac{1}{x}\right)^{11}$ is

(1) $11 \times {}^{11}C_5$ (2) $\frac{11}{2} \times {}^{11}C_6$ (3) $11\left({}^{11}C_5 + {}^{11}C_6\right)$ (4) 0

**22.** $\{b_i\}$, i = 1, 2, ….n is arithmetic sequence. If $b_1 + b_5 + b_{10} + b_{15} + b_{20} + b_{24} = 225$ then $\sum_{i=1}^{24} b_i$ is equal to:

(1) 600 (2) 900 (3) 300 (4) None of these

**23.** If the quadratic equations $3x^2 + ax + 1 = 0$ and $2x^2 + bx + 1 = 0$ have a common root then the value of $5ab - 2a^2 - 3b^2$, where $a, b \in R$, is equal to

(1) Zero (2) 1 (3) –1 (4) none of these

**24.** The intercept on the line y = x by the circle $x^2 + y^2 - 2x = 0$ is AB. Equation of the circle with AB as a diameter is:

(1) $x^2 + y^2 + x + y = 0$ (2) $x^2 + y^2 - x - y = 0$

(3) $x^2 + y^2 + x - y = 0$ (4) none of these

**Space for rough work**

## R-NET (SAMPLE PAPER) (XI to XII moving students)

### ANSWER KEY

| Que. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ans. | 2 | 4 | 3 | 1 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 2 | 4 | 2 | 1 | 4 | 2 | 3 | 3 | 4 |
| Que. | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | |
| Ans. | 2 | 2 | 2 | 2 | | | | | | | | | | | | | | | | |