

ACADEMIC SESSION : 2020-21

SAMPLE TEST PAPER (For XII to XIII Moving, Mains + Advanced)

Duration : 18 Min.

Max. Marks : 96

Name : _____ Application Form Number _____

Reg. Number :

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GENERAL INSTRUCTIONS

1. There are **08** 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.

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

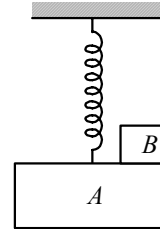
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DO NOT BREAK THE SEALS WITHOUT BEING INSTRUCTED TO DO SO BY THE INVIGILATOR

PHYSICS

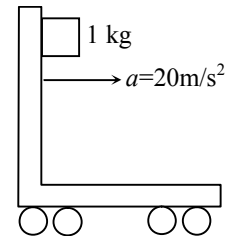
This section contains 8 multiple choice questions. Each question has four choices (1),(2),(3) and (4) out of which only one is correct

1. A block A of mass 2 kg is hanging in a vertical plane with a spring of stiffness constant $k = 100 \text{ N/m}$. 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

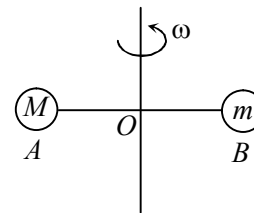


2. A particle is moving east-wards with a velocity of 4 m/s. In 10 seconds the velocity changes to 3 m/s northwards. The average acceleration in this time interval is
- (1) $\frac{1}{2} \text{ m/s}^2$ towards north-east (2) $\frac{1}{\sqrt{2}} \text{ m/s}^2$ towards north-west
- (3) $\frac{1}{\sqrt{2}} \text{ m/s}^2$ towards north-east (4) $\frac{1}{2} \text{ m/s}^2$ 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 ($g = 10 \text{ m/s}^2$)
- (1) 0.1 (2) 0.2
(3) 0.5 (4) 1

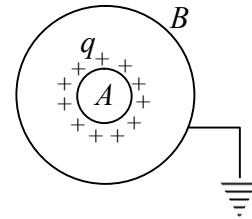


4. Two balls of mass $M = 9 \text{ g}$ and $m = 3 \text{ g}$ are attached by massless threads AO and OB . The length AB is 1 m. They are set in rotational motion in a horizontal plane about a vertical axis at O with constant angular velocity ω . The ratio of length AO and OB $\left(\frac{AO}{OB}\right)$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



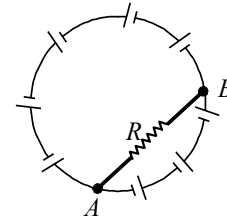
- (1) $\frac{1}{3}$ (2) 3 (3) $\frac{2}{3}$ (4) $\frac{3}{2}$

5. A and B are two concentric metallic hollow spheres. If A is given a charge q while B is earthed as shown in figure, then



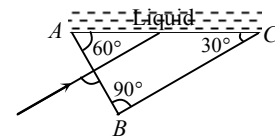
- (1) charge density of A and B are same
- (2) field inside and outside A is zero
- (3) field between A and B is not zero
- (4) field inside and outside B is zero

6. Each cell has emf ε and internal resistance r in the figure. Find the current through resistance R



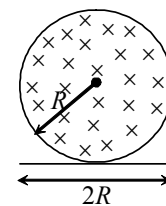
- (1) $\frac{4\varepsilon}{r}$
- (2) $\frac{3\varepsilon}{r}$
- (3) $\frac{\varepsilon}{r}$
- (4) zero

7. Light is incident normally on face AB of a prism as shown in figure. A liquid of refractive index μ is placed on face AC of the prism. The prism is made of glass of refractive index $3/2$. The limits of μ for which total internal reflection cannot take place on face AC is



- (1) $\frac{3\sqrt{3}}{4} > \mu > \frac{\sqrt{3}}{2}$
- (2) $\mu > \frac{3\sqrt{3}}{4}$
- (3) $\mu > \sqrt{3}$
- (4) $\mu < \frac{\sqrt{3}}{2}$

8. A uniform but time varying magnetic field is present in a circular region of radius R . The magnetic field is perpendicular and into the plane of the paper and the magnitude of the field is increasing at a constant rate α . There is a straight conducting rod of length $2R$ placed as shown in the figure. The magnitude of induced emf across the rod is



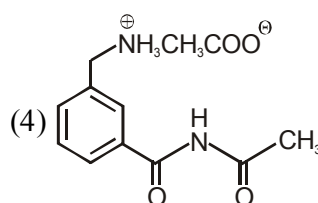
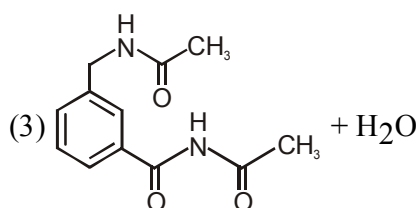
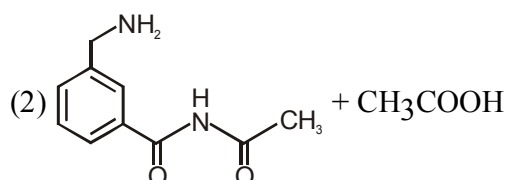
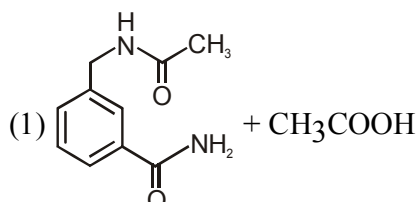
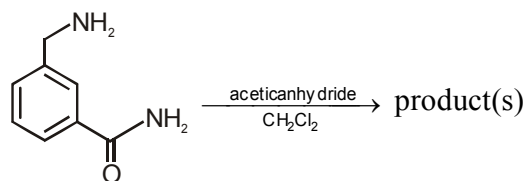
- (1) $\pi R^2 \alpha$
- (2) $\frac{\pi R^2 \alpha}{2}$
- (3) $\frac{R^2 \alpha}{\sqrt{2}}$
- (4) $\frac{\pi R^2 \alpha}{4}$

CHEMISTRY

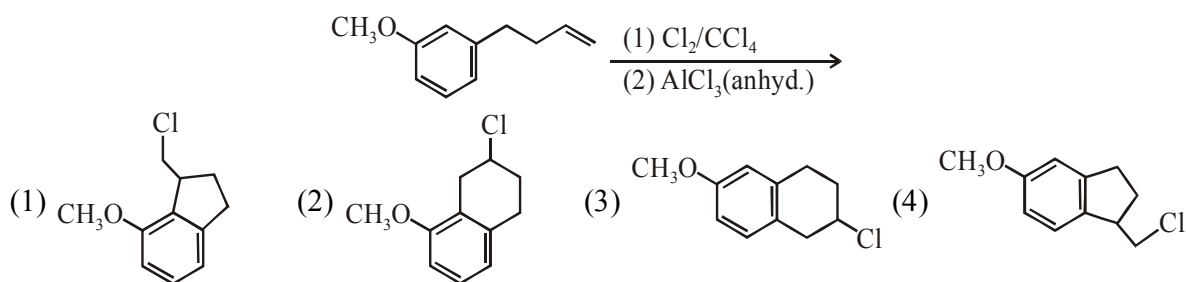
This section contains 8 multiple choice questions. Each question has four choices (1),(2),(3) and (4) out of which only one is correct

9. A 4.8 molal aqueous solution of ethyl alcohol is supplied, what is the mole fraction of ethyl alcohol in the solution.
 (1) 0.079 (2) 0.014 (3) 0.067 (4) 0.09
10. Which of the following metal on treatment with NaOH (aq.) will liberate H₂ gas.
 (1) Zn (2) Mg (3) K (4) Cu
11. A solution prepared at 25°C by mixing 10 mL of 1 molar HCl and 10 mL of 2 molar NaOH has a pH of
 (1) 14.0 (2) 0.3 (3) 13 (4) 13.7
12. In which of the following, E_a for backward reaction is greater than E_a forward reaction
 (i) $A \xrightarrow{E_a=50\text{Kcal}} B$; $\Delta H = -10 \text{ kcal}$
 (ii) $A \xrightarrow{E_a=50\text{Kcal}} B$; $\Delta H = +10 \text{ kcal}$
 (iii) $A + 10 \text{ K cal} \rightarrow B$; $E_a = 50 \text{ kcal}$
 (iv) $A - 10 \text{ K cal} \rightarrow B$; $E_a = 50 \text{ kcal}$
 Which is correct—
 (1) (i), (ii), (iii) (2) (i), (iv) (3) (ii), (iii), (iv) (4) (i), (iii)
13. First compound for Xe synthesized was—
 (1) $[\text{Xe F}^+][\text{Xe PtF}_5]^-$ (2) $[\text{Xe O}_2]$
 (3) $\text{Xe} [\text{PtF}_6]$ (4) $\text{O}_2[\text{Xe F}_6]$

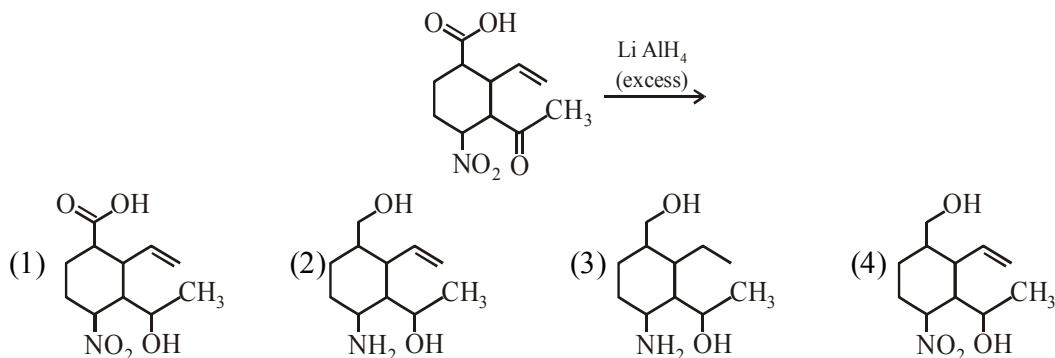
14. In the reaction shown below, the major product(s) formed is/are



15. The major product of the following reaction is :



16. The major product obtained in the following reaction is :-



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. If $f(x) = x \cdot \frac{(a^{1/x} - a^{-1/x})}{(a^{1/x} + a^{-1/x})}$, $x \neq 0$ ($a > 1$), $f(0) = 0$ then
- (1) f is differentiable at $x = 0$
 - (2) f is not differentiable at $x = 0$
 - (3) f is not continuous at $x = 0$
 - (4) None of these
18. Let z be a complex number such that $5z + 3\bar{z} = 8 + 2i$, then $\arg(z)$ is-
- | | |
|---------------------------------------|---------------------------------------|
| (1) $2n\pi + \frac{3\pi}{4}; n \in I$ | (2) $2n\pi + \frac{\pi}{2}; n \in I$ |
| (3) $2n\pi + \frac{\pi}{4}; n \in I$ | (4) $2n\pi + \frac{5\pi}{4}; n \in I$ |
19. Let $\vec{a} = \hat{i} - \hat{k}$, $\vec{b} = x\hat{i} + \hat{j} + (1-x)\hat{k}$ and $\vec{c} = y\hat{i} + x\hat{j} + (1+x-y)\hat{k}$. Then $[\vec{a} \vec{b} \vec{c}]$ depends on:
- | | |
|----------------------|-------------------------|
| (1) only y | (2) only x |
| (3) both x and y | (4) Neither x nor y |
20. Let $3x - y - 8 = 0$ be the equation of tangent to a parabola at the point $(7, 13)$. If the focus of the parabola is at $(-1, -1)$, its directrix is
- | | |
|-----------------------|-----------------------|
| (1) $x - 8y + 19 = 0$ | (2) $8x + y + 19 = 0$ |
| (3) $8x - y + 19 = 0$ | (4) $x + 8y + 19 = 0$ |
21. If r_1 and r_2 are the radii of smallest and largest circles which passes through $(5, 6)$ and touches the circle $(x - 2)^2 + y^2 = 4$, then $r_1 r_2$ is
- | | | | |
|--------------------|--------------------|--------------------|--------------------|
| (1) $\frac{4}{41}$ | (2) $\frac{41}{4}$ | (3) $\frac{5}{41}$ | (4) $\frac{41}{6}$ |
|--------------------|--------------------|--------------------|--------------------|

22. The tangent and normal drawn to the curve $y = x^2 - x + 4$ at $P(1, 4)$ cut the x axis at A and B respectively. If the length of the subtangent drawn to the curve at P is equal to the length of the subnormal then the area of the triangle PAB in square unit is :

- (1) 4 (2) 8 (3) 16 (4) 32

23. $\int \frac{\sec x(1 + \tan x)dx}{(e^{-x} + \sec x)} = f(x) + C$, where $f(0) = \ln 2$, then $f\left(\frac{\pi}{4}\right)$ is -

- (1) $\ln\left(1 + e^{\frac{\pi}{4}}\sqrt{2}\right)$ (2) $\ln(\sqrt{2})$ (3) $\ln(2\sqrt{2})$ (4) $\ln\left(\frac{e^{\frac{\pi}{4}}}{\sqrt{2}} + 1\right)$

24. The last two digits of the number 9^{200} are :

- (1) 81 (2) 43 (3) 29 (4) 01

Space for rough work

R-NET (SAMPLE PAPER) (XII to XIII 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	3	4	2	4	1	1	4	2	3	1	4	2	2	3	4	4
Que.	21	22	23	24																
Ans.	2	3	1	4																