



# Sri Chaitanya IIT Academy.,India.

✪ A.P ✪ T.S ✪ KARNATAKA ✪ TAMILNADU ✪ MAHARASTRA ✪ DELHI ✪ RANCHI

*A right Choice for the Real Aspirant*

ICON Central Office - Madhapur - Hyderabad

Sec: **Sr.Super60\_STERLING\_BT**

**Paper -2(Adv-2022-P2-Model)**

**Date: 03-09-2023**

**Time: 02.00Pm to 05.00Pm**

**CTA-04**

**Max. Marks: 180**

03-09-2023\_Sr.Super60\_STERLING\_BT\_Jee-Adv(2022-P2)\_CTA-04\_Syllabus

**PHYSICS : RPTA.1 TO RPTA.5 SYLLABUS**

**CHEMISTRY : RPTA.1 TO RPTA.5 SYLLABUS**

**MATHEMATICS : RPTA.1 TO RPTA.5 SYLLABUS**

**Sri Chaitanya Educational Institutions**  
**INDIA**

**Name of the Student:** \_\_\_\_\_

**H.T. NO:**

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**JEE-ADVANCE-2022-P2-Model**

Time:3Hr's

**IMPORTANT INSTRUCTIONS**

Max Marks: 180

**MATHEMATICS:**

Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 1 – 8)	Questions with Integer Answer Type	+3	-1	8	24
Sec – II(Q.N : 9 – 14)	Questions with Multiple Correct Choice with partial mark	+4	-2	6	24
Sec – III(Q.N : 15 – 18)	Questions with Single Correct Choice	+3	-1	4	12
<b>Total</b>				<b>18</b>	<b>60</b>

**PHYSICS:**

Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 19 – 26)	Questions with Integer Answer Type	+3	-1	8	24
Sec – II(Q.N : 27 – 32)	Questions with Multiple Correct Choice with partial mark	+4	-2	6	24
Sec – III(Q.N : 33 – 36)	Questions with Single Correct Choice	+3	-1	4	12
<b>Total</b>				<b>18</b>	<b>60</b>

**CHEMISTRY:**

Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 37 – 44)	Questions with Integer Answer Type	+3	-1	8	24
Sec – II(Q.N : 45 – 50)	Questions with Multiple Correct Choice with partial mark	+4	-2	6	24
Sec – III(Q.N : 51 – 54)	Questions with Single Correct Choice	+3	-1	4	12
<b>Total</b>				<b>18</b>	<b>60</b>

Sec: Sr.Super60\_STERLING\_BT

Space for rough work

Page 2

**Sri Chaitanya**  
Educational Institutions**THE PERFECT HAT-TRICK WITH ALL-INDIA RANK 1**  
**IN JEE MAIN 2023 JEE ADVANCED 2023 AND NEET 2023**

**JEE MAIN 2023**  
SINGARAJU VENKAT KOUNDINNYA  
RANK 1  
300/300



**JEE Advanced 2023**  
RANK 1  
VAVILALA CHOVILAS REDDY  
341/360



**NEET 2023**  
RANK 1  
BORA VARUN CHAKRAVARTHI  
720/720



**MATHEMATICS****Max Marks: 60****SECTION-I  
(INTEGER ANSWER TYPE)**

- This section contains EIGHT (08) questions.
- The answer to each question is a SINGLE DIGIT INTEGER ranging from 0 TO 9, BOTH INCLUSIVE.
- For each question, enter the correct integer corresponding to the answer using the mouse and the on-screen virtual Numeric keypad in the place designated to enter the answer.
- Answer to each question will be evaluated **according to the following marking scheme:**  
**Full Marks: +3 If ONLY the correct integer is entered;**  
**Zero Marks: 0 If the question is unanswered;**  
**Negative Marks: -1 In all other cases**

1. If  $\int_0^{\frac{\pi}{12}} \ln(\tan 3x) dx = K \cdot \int_0^{\frac{\pi}{12}} \ln(\tan x) dx$  then the value of  $18K$  equal to \_\_\_\_\_
2. The function  $f(x)$  is differentiable, continuous, and  $f(x) \neq 0$  for all  $x$  in the interval  $[4, 8]$ ,  $f(4) = \frac{1}{4}$ ,  $f(8) = \frac{1}{2}$ ,  $\int_4^8 \frac{[f'(x)]^2}{[f(x)]^4} dx = 1$  then  $6f(6) =$  \_\_\_\_\_
3. Let a function 'f' satisfies  $f(-x) = f(x)$  and  $f(3+x) = f(1-x) \forall x \in R$  and  $f(x) = \begin{cases} x; & 0 \leq x \leq 1 \\ 1-2x; & 1 < x \leq 2 \end{cases}$ . The number of points where function  $f(x)$  is discontinuous in  $[0, 100]$  is equal to  $D$  and value of  $\int_0^{100} f(x) dx$  is equal to  $I$ . The value of  $2D + I - 20$  is \_\_\_\_\_
4. If  $\lim_{x \rightarrow 0} \frac{\left( \int_0^x (1 - \cos t) dt \right) \left( \int_0^x (2 - \cos 2t) dt \right) \left( \int_0^x (3 - \cos 3t) dt \right) \dots \left( \int_0^x (n - \cos nt) dt \right)}{x^m}$  exist and has the value equal to 20, where  $m, n \in N$ , then find the value of  $n$ .
5. Let  $\int (2x^6 + 15x^4 + 2x^2 + 3) \cos 2x dx = f(x) \sin(2x) + g(x) \cos(2x) + K$  where  $f(x)$  and  $g(x)$  are polynomial functions of  $x$  and  $K$  is the constant of integration then the value of  $f(2) + g(1) - 65 =$  \_\_\_\_\_
6. Let  $f$  be a composite function of  $x$  defined by  $f(u) = \frac{1}{u^3 - 6u^2 + 11u - 6}$ , where  $u(x) = \frac{1}{x}$ . Then the number of points  $x$  where  $f$  is discontinuous is: \_\_\_\_\_







7. If  $I = \int (x^2 + 1) \left( (x+1)e^x \right)^2 dx = A(f(x))^2 + C$ , where  $C$  is constant of integration and  $f(-1) = \frac{2}{e}$ , then  $2A + f(0)$  is
8. Let  $f(x)$  be a polynomial of degree 6 such that  $f(2) = 85$  and attains its local minimum value 4 at points  $x = -1, x = 1$  and  $x = 5$ . The local maximum value of  $f(x)$  lies at  $x = \alpha$  and  $x = \beta$ . If  $\lim_{x \rightarrow (\alpha+\beta)} \left( \frac{x^2 - 9}{x^2 - 5x + 6} \right) = \lambda$  then the value of  $[\lambda]$  is (where  $[\cdot]$  represents greatest integer function)

**SECTION – II**  
**(ONE OR MORE CORRECT ANSWER TYPE)**

• This section contains SIX (06) questions.

• Each question has FOUR options. **ONE OR MORE THAN ONE** of these four option(s) is(are) correct answer(s).

• For each question, choose the option(s) corresponding to (all) the correct answer(s).

• Answer to each question will be evaluated **according to the following marking scheme**:

**Full Marks:** +4 If only (all) the correct option(s) is(are) chosen; **Partial Marks** +3 If all the four options are correct but **ONLY** three options are chosen;

**Partial Marks:** +2 If three or more options are correct but **ONLY** two options are chosen, both of which are correct;

**Partial Marks:** +1 If two or more options are correct but **ONLY** one option is chosen and it is a correct option;

**Zero Marks:** 0 If none of the options is chosen (i.e. the question is unanswered);

**Negative Marks:** -2 In all other cases.

9. Consider  $f(x) = \begin{cases} \sin(\cos x) + \cos(\sin x), & -\frac{\pi}{2} \leq x \leq 0 \\ \sin(a \cos x) - x + 1, & 0 < x \leq \pi \end{cases}$ , then which of the following option(s) is/are TRUE?
- A) Difference of maximum and minimum value of  $f(x)$  in  $\left[-\frac{\pi}{2}, 0\right]$  is greater than 1
- B) There are exactly two integers  $a \in (0, \pi)$  for which  $f(x)$  has maximum at  $x = 0$ .
- C)  $f(x)$  has local minimum at  $x = \frac{\pi}{4}$
- D) There are exactly three integers  $a \in (0, \pi)$  for which  $f(x)$  has maximum at  $x = 0$
10. Let  $f(x) = \sin^{-1} \left[ \sqrt{1 - \sqrt{1 - x^2}} \right]$  then which of the following option(s) is/true? (where  $[\cdot]$  denotes greatest integer function)





A) Domain of  $f(x)$  is  $[-1,1]$

B)  $f(x)$  is discontinuous at two points in its domain

C)  $f(x)$  is discontinuous at  $x = 0$

D)  $f(x)$  is non derivable at  $x = 0$

11. If the tangent at a point  $P_1$  (other than  $(0, 0)$ ) on the curve  $ax^3 - y + b = 0$  meets the curve again at  $P_2$ . The tangent at  $P_2$  meets the curve at  $P_3$  and so on. If the abscissa of  $P_1, P_2, P_3, \dots, P_n$  form a G.P. then  $(a, b)$  may be:

A)  $(1, 0)$

B)  $(2, 7)$

C)  $(3, 5)$

D)  $(4, 9)$

12. If  $\alpha, \beta \in \mathbb{R}, \beta \neq 0, n \in \mathbb{N}$  and  $\lim_{n \rightarrow \infty} \frac{n^2 \sqrt{(1!)(2!)(3!) \dots (n!)}}{n^\alpha} = \beta$  then

A)  $\alpha = \frac{1}{2}$

B)  $\beta = e^{-\frac{3}{4}}$

C)  $\alpha = 1$

D)  $\beta = \frac{1}{\sqrt{e}}$

13. For every twice differentiable function  $f: \mathbb{R} \rightarrow [-2, 2]$  with  $(f(0))^2 + (f'(0))^2 = 85$ , which of the following statement(s) is (are) TRUE?

A) Three exist  $r, s \in \mathbb{R}$ , Where  $r < s$ , such that  $f$  is one-one on the open interval  $(r, s)$

B) There exists  $x_0 \in (-4, 0)$  such that  $|f'(x_0)| \leq 1$

C)  $\lim_{x \rightarrow \infty} f(x) = 1$

D) There exists  $\alpha \in (-4, 4)$  such that  $f(\alpha) + f''(\alpha) = 0$  and  $f'(\alpha) \neq 0$

14. Let  $f: [0, \infty) \rightarrow [2, \infty)$  be a derivable function which is also surjective such that  $f(0) = 2$  and satisfy  $(f(x))^2 - (f(y))^2 = 3f(x) - 3f(y) + \sqrt{x} - \sqrt{y} \quad \forall x, y \geq 0$  then which is /are correct

A)  $\lim_{x \rightarrow 0^+} \frac{4f(x) - 6 - 2e^{\sqrt{x}}}{\sqrt{x}} = 2$

B)  $y = f(x)$  is injection

C)  $y = f(x)$  has a point of inflexion

D) The equation  $f(x) - 5 = 0$  has two solutions



**JEE MAIN 2023**  
SINGARAJU  
VENKAT KOUNDINYA  
RANK 1  
300  
300



**RANK 1**

**JEE Advanced 2023**  
VAVILALA  
CHIDVILAS REDDY  
RANK 1  
341  
360



**RANK 1**

**NEET 2023**  
BORA VARUN  
CHAKRAVARTHI  
RANK 1  
720  
720



**RANK 1**



### SECTION – III (SINGLE CORRECT ANSWER TYPE)

This section contains **FOUR (04)** questions.

- Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four options is the correct answer.
- For each question, choose the option corresponding to the correct answer.
- Answer to each question will be evaluated according to the following marking scheme:

**Full Marks** : +3 If **ONLY** the correct option is chosen;

**Zero Marks** : 0 If none of the options is chosen (i.e. the question is unanswered);

**Negative Marks** : -1 In all other cases

15. A fraction  $f(x)$  is defined for all real number and satisfy  $f(2+x) = f(2-x)$  and  $f(7+x) = f(7-x)$  for all real  $x$ . If  $x=0$  is a root of  $f(x)=0$ , then the least number of roots of  $f(x)=0$  in the interval  $[-1000, 1000]$  is
- A) 101                      B) 201                      C) 301                      D) 401
16. If  $y = \frac{x}{x^2 + \frac{x}{x^2 + \dots \infty}}$ , then  $\int \frac{(y-x^2)dx}{(x^2+y)(x+y^2)} = f(y)$  then  $100f'(4)$  is equal to
- A) 100                      B) 25                      C) 50                      D) 0
17. The value of  $\lim_{n \rightarrow \infty} \left( \lim_{m \rightarrow \infty} \left( \sum_{r=1}^n \left( \sum_{k=1}^{mr} \frac{mn^2}{(m^2n^2 + k^2)(n^2 + r^2)} \right) \right) \right)$  is  $\frac{\lambda\pi^2}{160}$ . Then the value of  $100\lambda$  is \_\_\_\_\_
- A) 500                      B) 1600                      C) 3200                      D) 800
18. Let  $f(x) = \{x\}[x]$ ;  $g(x) = ax^2$  the sum of all real solutions of equation satisfying  $f(x) = g(x)$  is 420 (where  $a$  is (+ve) rational number), then  $a$  is equal to (where  $[.]$  and  $\{.\}$  represents greatest integer function and fractional part function respectively)
- A)  $\frac{28}{900}$                       B)  $\frac{29}{900}$                       C)  $\frac{31}{900}$                       D)  $\frac{37}{900}$







## PHYSICS

Max Marks: 60

SECTION-I  
(INTEGER ANSWER TYPE)

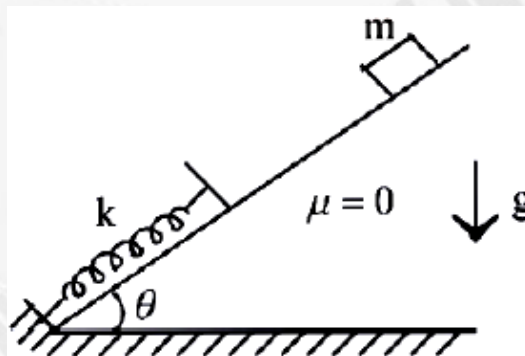
- This section contains EIGHT (08) questions.
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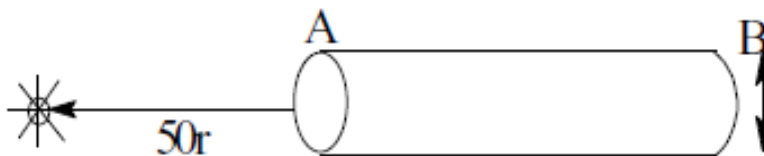
Negative Marks: -1 In all other cases

19. A block of mass ' $m$ ' is released on a smooth fixed incline plane at  $t = 0$ . The spring shown is ideal. The block touches the spring for the first time at  $t = t_1$  with speed  $v_0$ . The block returns to initial position of the release for the first time at  $t = t_2$ . Then the number of times speed of the block becomes  $v_0$ , in  $t = 0$  to  $t = t_2$  is

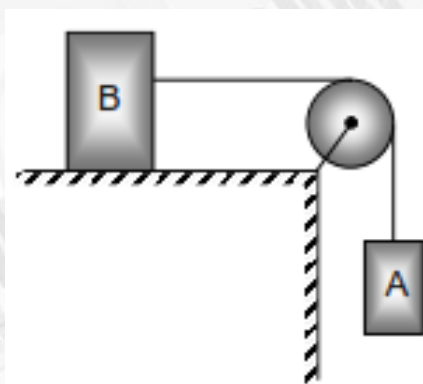


20. A vehicle moves along a curve  $y = \frac{x^2}{2}$  with constant speed. Find the maximum speed (in m/s) with which it can move on the curve without slipping. (take coefficient of friction as  $\frac{9}{10}$  and  $g = 10 \text{ m/s}^2$ )
21. A cylindrical rod of length 64cm and cross-section radius  $r = (2/\sqrt{\pi})$  cm is placed at a distance  $50r$  from an infrared point source S of power 1.25 kW as shown in the figure. The lateral surface of the rod is perfectly insulated from the surroundings. The cross section A absorbs 80% of the incident energy, has temperature  $T_A$  in steady state. The surface B is radiating energy into space and the wavelength emitted by it with maximum energy density is  $100,000 \text{ \AA}$ . The value of  $T_A$  is  $X \times 100$  ( $T_A$  is temperature of end A in Kelvin) if conductivity varies with temp as  $K = \frac{T}{T_A}$ . Assume that the rate of flow of heat through the rod is steady (Wein's constant = 0.003 Km). Find the value of X

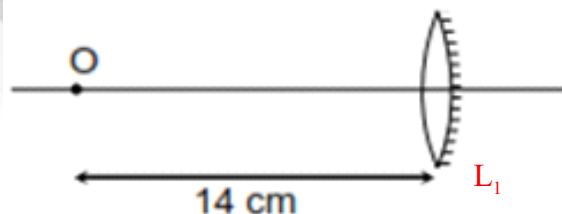




22. A block B of mass  $M_B = \pi kg$  placed on rough horizontal surface is connected with block A with the help of string(ideal). The string passes over fixed horizontal cylinder. The coefficient of friction between block B and ground as well as between string and cylinder is  $\mu = \frac{7}{11}$ . Find the minimum mass of block A in kg so that block B starts sliding. (Take value of  $\pi = \frac{22}{7}$  and  $e = 2.72$ )

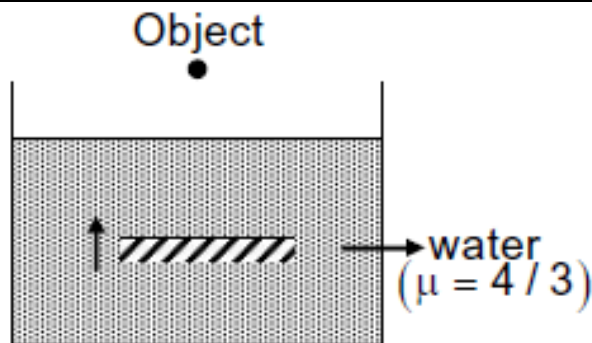


23. Object O is placed at a distance of 14cm from an equi convex lens  $L_1$  of refractive index  $\mu = \frac{3}{2}$  and radius of curvature of lens surface is 32 cm. One of its surface is silvered another convex lens  $L_2$  of focal length 24 cm is placed between object and silvered lens such that the final image coincides with the object. The distance between object and the lens  $L_2$  in cm is ..... ( Take first Refraction from Lens  $L_2$  )

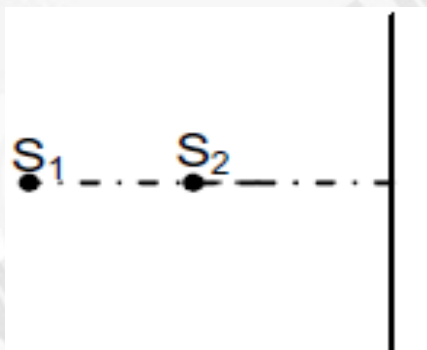


24. Mirror in the arrangement shown in figure is moving up with speed 8 cm/sec. Speed of final image (in cm/sec) is  $4x$ , calculate  $x$ .



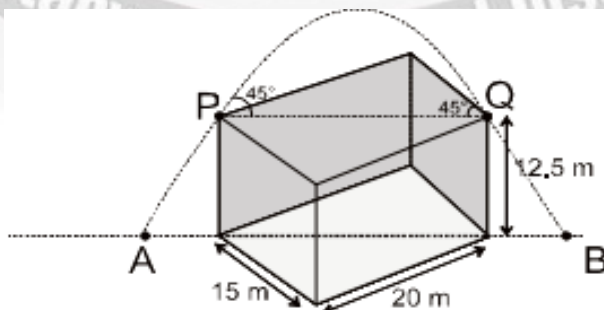


25. Two coherent monochromatic point sources  $S_1$  and  $S_2$  are placed in front of an infinite screen as shown in figure. Wavelength of the light emitted by both the sources is  $\lambda$ . Initial phase difference between the source is zero.



Initially  $S_1S_2 = 2.5\lambda$  and the number of bright circular rings on the screen is  $n_1$ . If the distance  $S_1S_2$  is increased and made  $5.7\lambda$  the number of bright circular rings becomes  $n_2$ . The difference  $n_2 - n_1$  is:

26. A commander fires a shell at certain angle of projection from 'A' which clears the building (cuboid) of dimensions  $20 \times 15 \times 12.5m^3$  in its diagonal plane. Shell just clears the roof diagonally at points P and Q and falls on the other side of the building at B, and makes  $45^\circ$  angle with horizontal at P and Q as shown in the figure. If the range AB of the shell is  $N \times 5\sqrt{3}$  metre then find N ( $g = 10m/s^2$ ).





## SECTION – II

### (ONE OR MORE CORRECT ANSWER TYPE)

• This section contains SIX (06) questions.

• Each question has FOUR options. **ONE OR MORE THAN ONE** of these four option(s) is(are) correct answer(s).

• For each question, choose the option(s) corresponding to (all) the correct answer(s).

• Answer to each question will be evaluated **according to the following marking scheme:**

*Full Marks: +4* If only (all) the correct option(s) is(are) chosen; *Partial Marks +3* If all the four options are correct but **ONLY** three options are chosen;

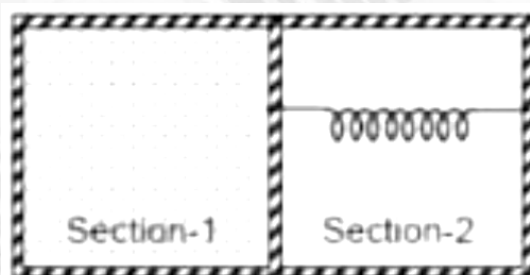
*Partial Marks: +2* If three or more options are correct but **ONLY** two options are chosen, both of which are correct;

*Partial Marks: +1* If two or more options are correct but **ONLY** one option is chosen and it is a correct option;

*Zero Marks: 0* If none of the options is chosen (i.e. the question is unanswered);

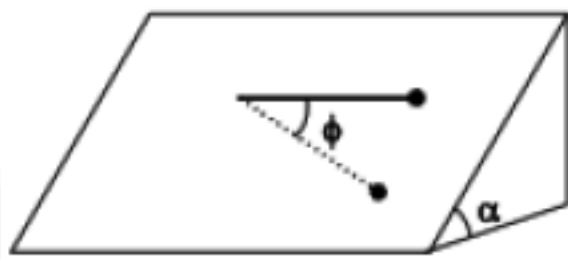
*Negative Marks: -2* In all other cases.

27. A smooth adiabatic massless piston divides a thermally insulated cylinder in two section of equal volume initially. Section -1 containing two moles of an ideal diatomic gas and in section -2 a vacuum is maintained. An ideal compressed spring is connected in section-2 as shown in figure. The natural length of spring is equal to the length of cylinder. Neglecting heat capacity of cylinder, piston and spring. Now gas is heated in section -1. Choose the correct options.



- A) Change in the internal energy of the gas during heating of the gas is 10 times the work done by the gas for the same time interval.
- B) Change in internal energy of the gas during heating of the gas is 5 times the work done by the gas for the same time interval.
- C) Heat capacity of gas is  $3R$
- D) Heat capacity of gas is  $6R$
28. One end of a thread of length  $\ell = 1\text{m}$  is attached to an inclined plane of angle of elevation of  $\alpha$ . A point like body of mass  $m = 1\text{kg}$  is attached to the other end of the thread as shown in the figure. The body is released without initial speed, such that the thread is tight and horizontal. The coefficient of friction between the slope and the body is  $\mu$ .





A) The tension in the thread when the angle between the thread and the horizontal is  $\phi$

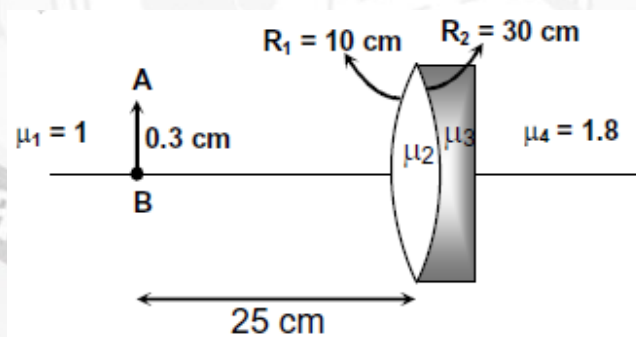
$$T = (3 \sin \phi \sin \alpha - 2 \mu \phi \cos \alpha) mg$$

B) The tension in the string will be maximum when  $\phi = 90^\circ$

C) The tension in the string will be maximum when  $\phi = \cos^{-1} \left( \frac{2\mu}{3 \tan \alpha} \right)$

D) The maximum speed of the particle will be when  $\phi = \cos^{-1} (\mu \cot \alpha)$

29. The refractive indices of the two thin lenses are  $\mu_2 = 1.2$  and  $\mu_3 = 1.5$  respectively. The medium on the two sides of the combined lens are having refractive indices  $\mu_1 = 1$  and  $\mu_4 = 1.8$  as shown in the figure. A linear object AB of size 0.30 cm is placed at a distance 25 cm from the combined lens as shown in the figure. Then choose the correct option(s).

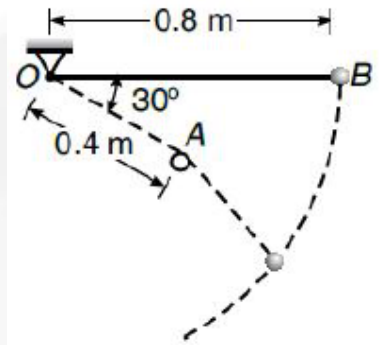


- A) The image is formed at a distance 40 cm to the right of the combined lens.  
 B) The image is formed at a distance 60 cm to the left of the combined lens.  
 C) The size of the image formed is 0.20 cm  
 D) The size of the image formed is 0.40 cm

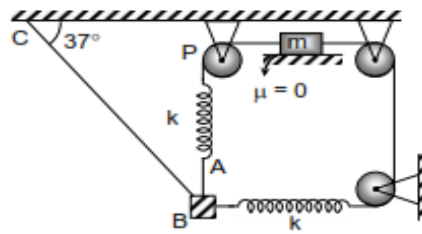




30. A small sphere B of mass  $m$  is released from rest in the position shown and swings freely in a vertical plane, first about O and then about the peg A after the cord comes in contact with the peg. The tension in the cord



- A) Just before the sphere comes in contact with the peg is  $\frac{3mg}{2}$   
 B) Just before the sphere comes in contact with the peg is  $\frac{5mg}{2}$   
 C) Just after it comes in contact with the peg  $\frac{5mg}{2}$   
 D) Just after it comes in contact with the peg  $\frac{3mg}{2}$
31. In the shown figure a block of mass  $m = \frac{1}{2} \text{ kg}$  is suspended in equilibrium with the help of ideal string and two ideal spring of force constant  $k = 100 \text{ N/m}$ . Now spring AP is cut. Pulleys are massless, frictionless, AP is vertical and other spring is horizontal. Just after cutting the spring ( $g = 10 \text{ m/s}^2$ )

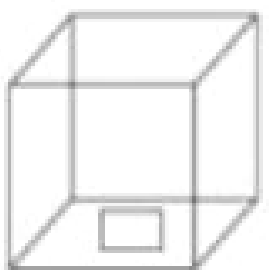


- A) Tension in string BC is  $3\text{N}$   
 B) Tension in string BC is  $\frac{37}{7} \text{ N}$   
 C) Acceleration of the suspended block is  $\frac{32}{7} \text{ m/s}^2$   
 D) Acceleration of the suspended block is  $8 \text{ m/s}^2$





32. A solid block of mass 2 kg is resting inside a cube as shown in the figure. The cube is moving with the velocity  $\vec{V} = 5t\hat{i} + 2\hat{j}$  m/s ( $t$  is time in second). The block is at rest with respect to the cube and coefficient of friction between the surface of cube and the block is 0.6. Then ( $g = 10 \text{ m/s}^2$ )



- A) Force of friction acting on the block is 10 N  
 B) Force of friction acting on the block is 4 N  
 C) The total force exerted by the block on the cube is 14 N  
 D) The total force exerted by the block on the cube is  $10\sqrt{5}$  N

**SECTION – III**  
**(SINGLE CORRECT ANSWER TYPE)**

This section contains **FOUR (04)** questions.

- Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four options is the correct answer.
- For each question, choose the option corresponding to the correct answer.
- Answer to each question will be evaluated according to the following marking scheme:

**Full Marks** : +3 If **ONLY** the correct option is chosen;

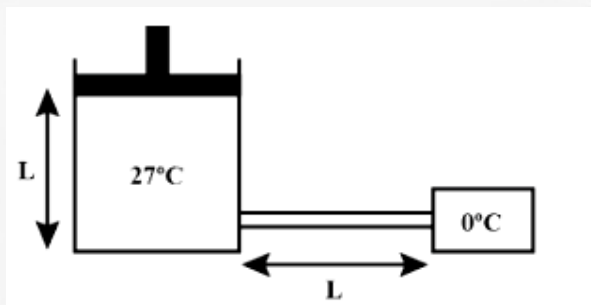
**Zero Marks** : 0 If none of the options is chosen (i.e. the question is unanswered);

**Negative Marks** : -1 In all other cases

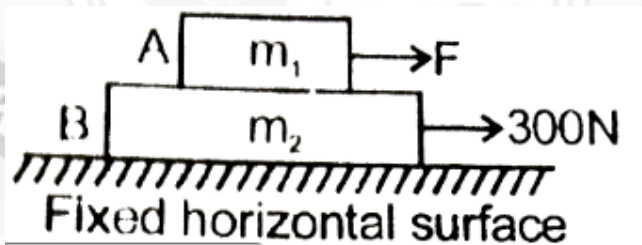
33. The value of each main scale division of a vernier calipers is 1mm and vernier scale divisions are in A.P. 1<sup>st</sup> division is 0.95mm. 2<sup>nd</sup> division is 0.9 mm; third division is 0.85 mm and so on. When an object is placed between jaws of vernier calipers, zero of vernier lies between 3.1 cm and 3.2 cm and 4<sup>th</sup> division of vernier coincides with main scale division (neglect the zero error) reading of vernier is  
 A) 3.12 cm      B) 3.14cm      C) 3.15 cm      D) 3.18cm
34. Consider two steamers A and B on a calm sea. Steamer A is moving towards the north with a constant speed  $V_A = 30 \text{ km/h}$  and steamer B towards the south with a constant speed  $V_B = 10 \text{ km/h}$ . If smoke ejected by steamer A spreads in a straight line from the steamer (with respect to steamer) towards the west and smoke ejected by steamer B spreads in another straight line from the steamer (with respect to steamer) towards the north-west, determine magnitude of the wind velocity. (Ignore upward motion of smoke)  
 A) 30 kmph      B) 40 kmph      C)  $40\sqrt{2}$  kmph      D) 50 kmph



35. 0.5 mole of an ideal gas at constant temperature  $27^{\circ}\text{C}$  kept inside a cylinder of length  $L$  and cross-sectional area. A closed by a massless piston. The cylinder is attached with a conducting rod of length  $L$  cross-section area  $(1/9)m^2$  and thermal conductivity  $k$  whose other end is maintained at  $0^{\circ}\text{C}$ . If piston is moved such that rate of heat flow through the conducting rod is constant then the velocity of piston when it is at height  $L/2$  from the bottom of cylinder is [Neglect any kind of heat loss from system]



- A)  $\frac{k}{50R}$       B)  $\frac{k}{100R}$       C)  $\frac{k}{110R}$       D)  $\frac{k}{90R}$
36. The coefficient of friction between block A of mass  $m_1 = 5\text{kg}$  and block B of mass  $m_2 = 10\text{kg}$  is  $\mu = 0.5$ . There is no friction force between block B and fixed horizontal surface. A force of 300 N acts on block B in horizontal direction and a horizontal force of magnitude  $F$  acts on block A as shown. Both towards right. The minimum value of  $F$  such that relative motion starts between A and B is



- A) 200 N      B) 187.5 N      C) 150N      D) 0



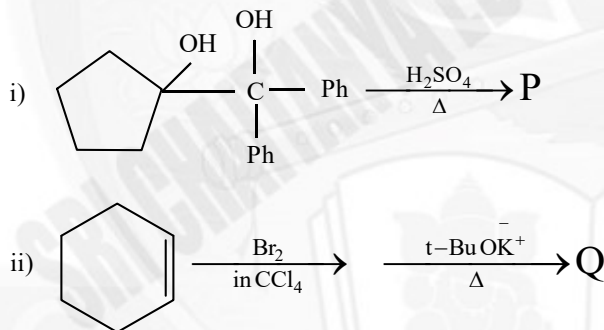
## CHEMISTRY

Max Marks: 60

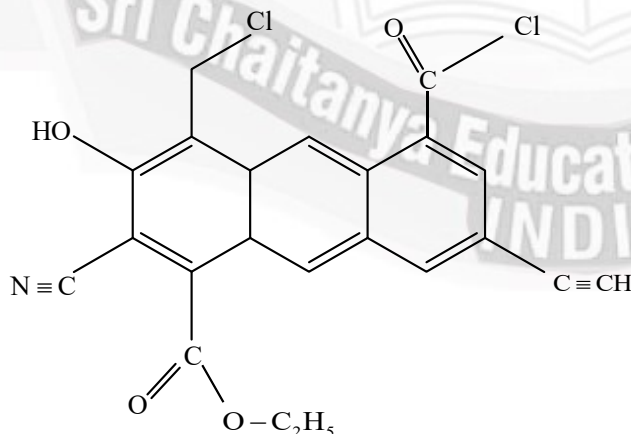
SECTION-I  
(INTEGER ANSWER TYPE)

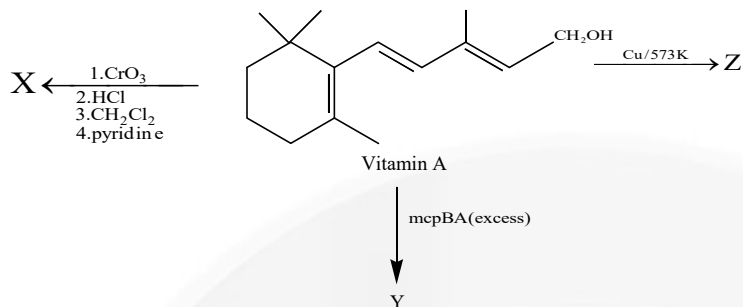
- This section contains EIGHT (08) questions.
- The answer to each question is a SINGLE DIGIT INTEGER ranging from 0 TO 9, BOTH INCLUSIVE.
- For each question, enter the correct integer corresponding to the answer using the mouse and the on-screen virtual Numeric keypad in the place designated to enter the answer.
- Answer to each question will be evaluated according to the following marking scheme:  
 Full Marks: +3 If ONLY the correct integer is entered;  
 Zero Marks: 0 If the question is unanswered;  
 Negative Marks: -1 In all other cases

37. In Zeisel's method for the determination of methoxyl groups, a sample of 2.68 gm of a compound (A) gave 14.08 gm of AgI. If the molecular weight of compound (A) is 134. Find the number of  $(-OCH_3)$  group(s) in the compound (A).  
 (Given is  $Ag = 108, I = 127$ ) (Rounding to the nearest integer)
38. If (dl) or  $(\pm)$  2-methyl butanoic acid were esterified by reaction with (dl) or  $(\pm)$  2-butanol, how many optically active compounds would be present in the final equilibrium reaction mixture?
39. How many of the following compounds can be methylated by diazomethane?  
 $C_2H_5COOH$ ,  $C_2H_5NH_2$ ,  $C_6H_5OH$  and  $CH_3COCH_2COOC_2H_5$
40. Total No. of  $\pi$  - Bond in major product P+Q are.



41. How many moles of  $MeMgI$  will be consumed by one mole of the following compound.

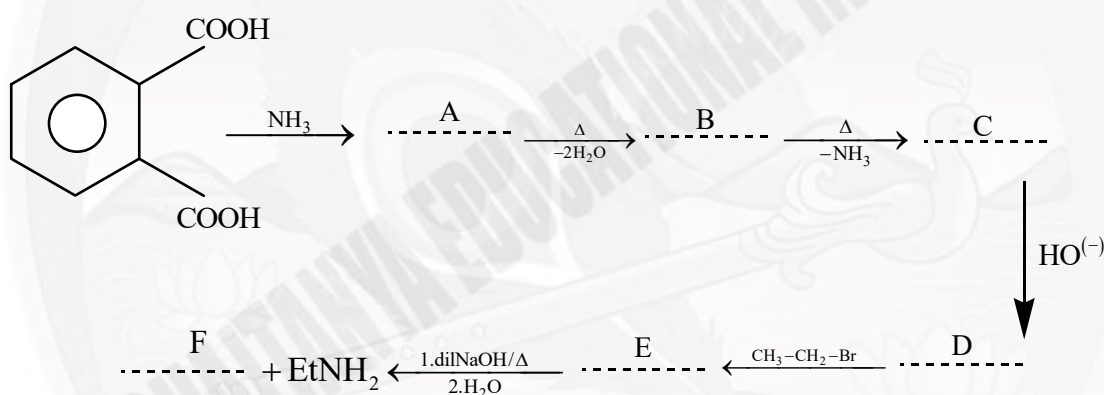




42.

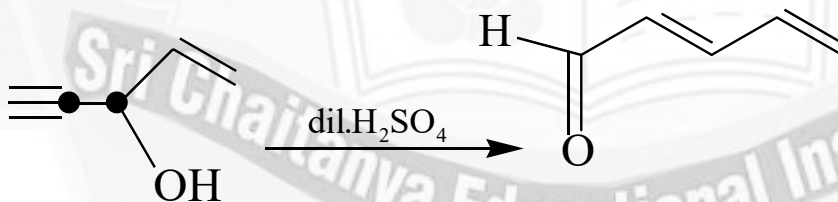
In the given reaction total No. of products x,y,z having P No. of oxygen atoms then report your answer in  $\frac{p}{2}$  is (excluding stereoisomers)

43.



Find the number of Hydrogen attached by nitrogen only in product A,B,C,D,E and F. Then report your answer in A-B+C+D+E+F is

44.



Give the mechanism

In the given reaction. Find the No. of Carbocation as a intermediate

## SECTION – II

### (ONE OR MORE CORRECT ANSWER TYPE)

\*This section contains SIX (06) questions.

\*Each question has FOUR options. **ONE OR MORE THAN ONE** of these four option(s) is(are) correct answer(s).

\*For each question, choose the option(s) corresponding to (all) the correct answer(s).

Sec: Sr.Super60\_ **STERLING\_BT**

Space for rough work

Page 16



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341/360



**RANK 1**

**NEET 2023**  
BORA VARUN CHAKRAVARTHI  
RANK 1  
720/720



**RANK 1**



• Answer to each question will be evaluated according to the following marking scheme:

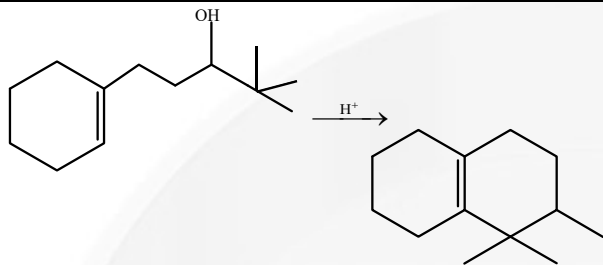
Full Marks: +4 If only (all) the correct option(s) is(are) chosen; Partial Marks +3 If all the four options are correct but ONLY three options are chosen;

Partial Marks: +2 If three or more options are correct but ONLY two options are chosen, both of which are correct;

Partial Marks: +1 If two or more options are correct but ONLY one option is chosen and it is a correct option;

Zero Marks: 0 If none of the options is chosen (i.e. the question is unanswered);

Negative Marks: -2 In all other cases.



45.

The above transformation involves

A) protonation at the C=C linkage

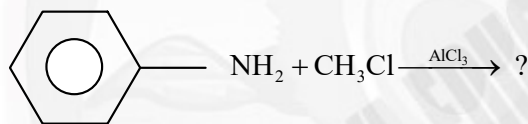
B) protonation at -OH group

C) formation of 2° carbocation

D) formation of 3° carbocation

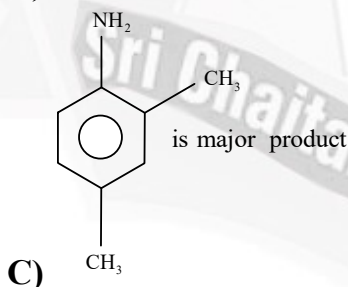
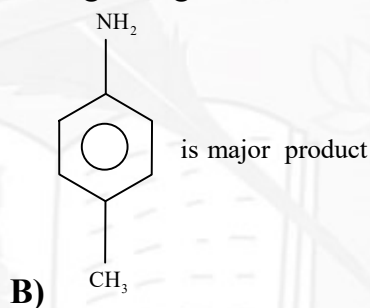
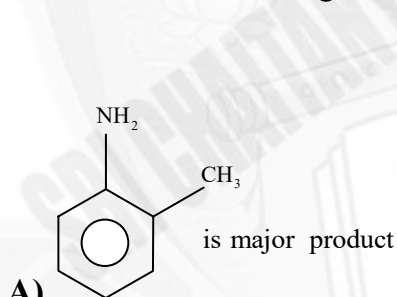
46.

Which of the following combination(s) can't be used for preparing an ether?

A)  $C_6H_5ONa + (CH_3)_2SO_4$ B)  $C_6H_5Br + CH_3CH_2ONa$ C)  $p-NO_2C_6H_4Br + CH_3CH_2ONa$ D)  $C_6H_5ONa + (CH_3)_3CBr$ 

47.

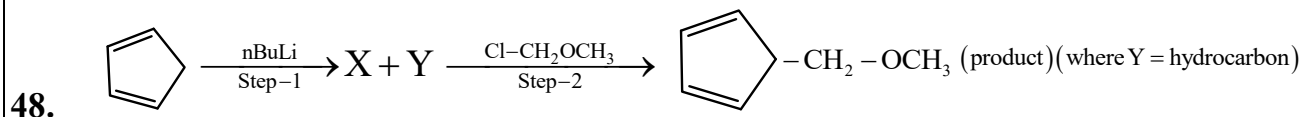
Which of the following statement is false regarding above reaction?



D) No substitution

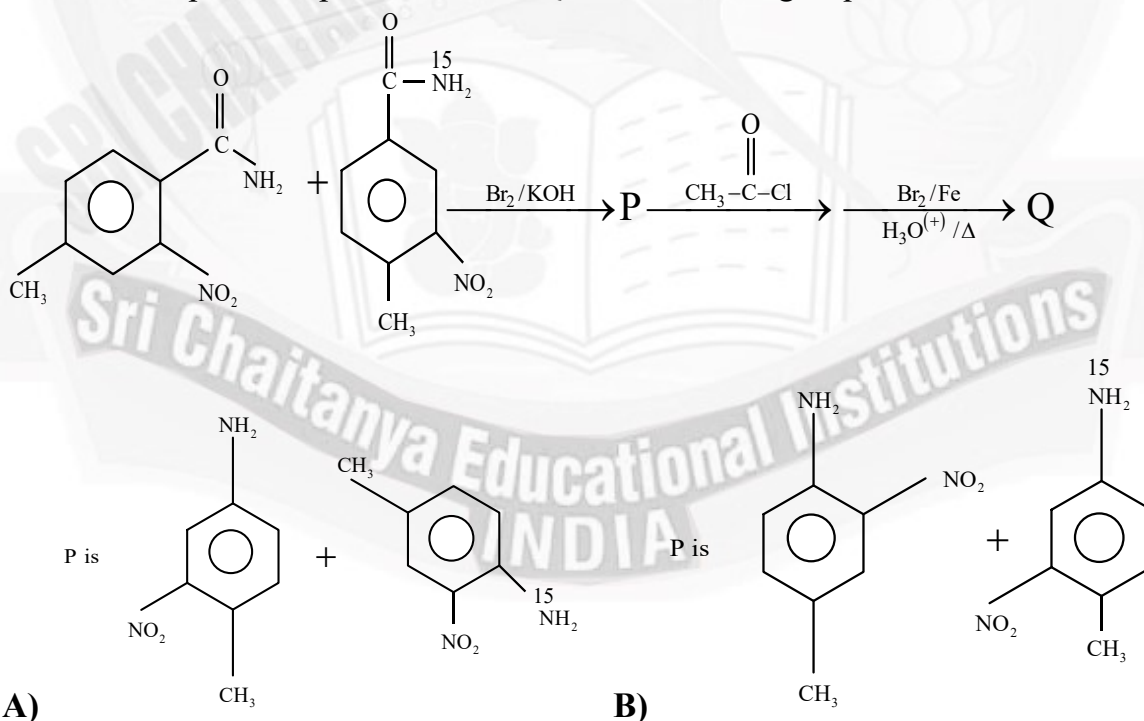


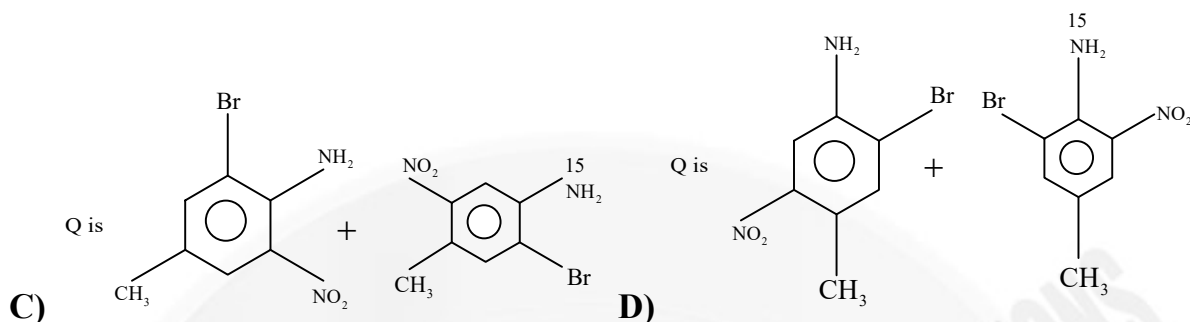




In the above reaction which of the following statement is correct?

- A) Step – 1 – is an  $S_N2$  reaction
- B) The hydrocarbon product of step-1 is  $\text{CH}_3(\text{CH}_2)_2\text{CH}_3$ .
- C) X = cyclopentadiene
- D) the nucleophile in 2<sup>nd</sup> reaction is cyclopentadienyl anion
49. The correct statement(s) about  $\text{C}_5\text{H}_{11}\text{Br}$  is/are:
- A) Total 8 structural isomers are possible for  $\text{C}_5\text{H}_{11}\text{Br}$
- B) Two out of the all structural isomers of  $\text{C}_5\text{H}_{11}\text{Br}$  are inert towards  $E_2$  reaction
- C) Only one out of all structural isomers of  $\text{C}_5\text{H}_{11}\text{Br}$  gives three products in  $E_2$  reaction.
- D) Only two out of all structural isomers of  $\text{C}_5\text{H}_{11}\text{Br}$  produce alkene which can show geometrical isomerism in  $E_2$  reaction.
50. The correct option for products P and Q in the following sequence of reaction is / are





### SECTION – III (SINGLE CORRECT ANSWER TYPE)

This section contains **FOUR (04)** questions.

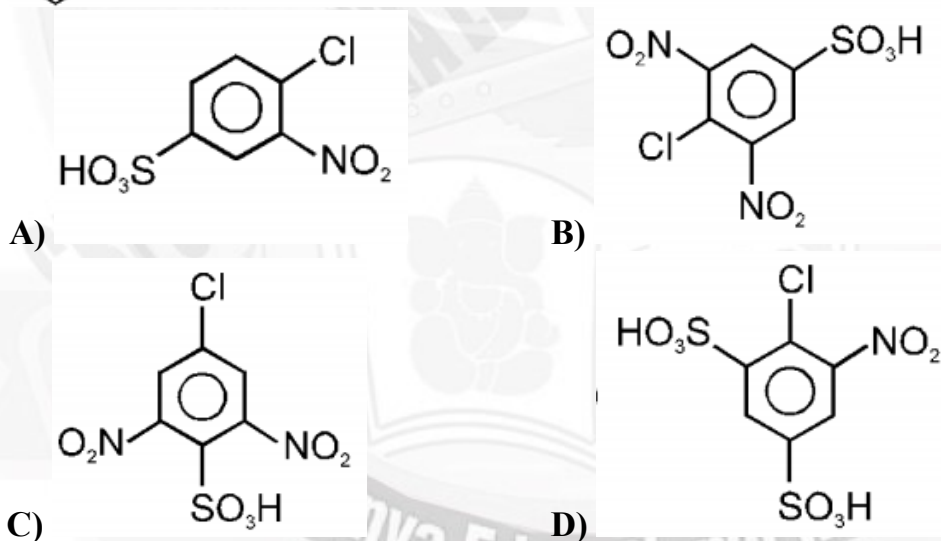
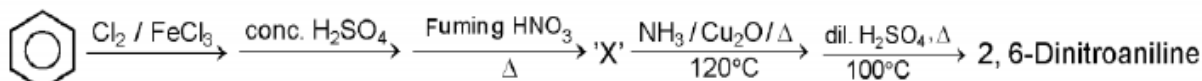
- Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four options is the correct answer.
- For each question, choose the option corresponding to the correct answer.
- Answer to each question will be evaluated according to the following marking scheme:

**Full Marks** : +3 If **ONLY** the correct option is chosen;

**Zero Marks** : 0 If none of the options is chosen (i.e. the question is unanswered);

**Negative Marks** : -1 In all other cases

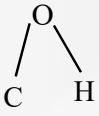
51. The Intermediate product 'X' of following synthesis is identified as :



52. An ether (A),  $\text{C}_5\text{H}_{12}\text{O}$ , when heated with excess of hot concentrated HI produced two alkyl halides which when treated with NaOH yielded compounds (B) and (C). Oxidation of (B) and (C) gave a propanone and an ethanoic acid respectively. The IUPAC name of the ether (A) is:

- A) 2-ethoxypropane      B) ethoxypropane  
C) methoxybutane      D) 2-methoxybutane



53. Which one of the following statements is not correct?
- A) Alcohols are weaker acids than water (except  $\text{CH}_3\text{OH}$ )
- B) Acid strength of alcohols decreases in the following  $\text{RCH}_2\text{OH} > \text{R}_2\text{CHOH} > \text{R}_3\text{COH}$
- C) Carbon-oxygen bond length in methanol ( $\text{CH}_3\text{OH}$ ) is shorter than that of C-O bond length in phenol.
- D) The bond angle  in methanol is  $108.9^\circ$ .
54. Aniline is reacted with bromine water and the resulting product is treated with an aqueous solution of sodium nitrite in presence of dilute hydrochloric acid. The compound so formed is converted into a tetrafluoroborate which is subsequently heated dry. The final product is
- A) 1,3,5-tribromobenzene                      B) p-bromofluorobenzene
- C) p-bromaniline                                  D) 2,4,6-tribromofluorobenzene







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Category Ranks

**10**  
RANKS (50%)

BELOW  
**100**  
All India Open  
Category Ranks

**32**

BELOW  
**1000**  
All India Open  
Category Ranks

**181**

BELOW  
**100**  
All India  
Category Ranks  
Count

**89**

BELOW  
**1000**  
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