Sri Chaitanya IIT Academy.,India.

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A right Choice for the Real Aspirant

ICON Central Office - Madhapur - Hyderabad

Sec:Sr.Super60_NUCLEUS & STERLING_BT	Paper -1(Adv-2022-P1-Model)	Date: 10-09-2023
Time: 09.00Am to 12.00Pm	RPTA-06	Max. Marks: 180

10-09-2023_Sr.Super60_NUCLEUS&STERLING_BT_Jee-Adv(2022-P1)_RPTA-06_Syllabus

PHYSICS : COM & Collisions, Conservation of linear momentum and mechanical energy. Systems of particles; Centre of mass and its motion; Impulse; Elastic and inelastic collisions.

CHEMISTRY : Aldehydes & Ketones, Carboxylic acid & Derivatives: Aldehydes & Ketones: Preparation of aldehydes and ketones from acid chlorides and nitriles; aldehydes from esters; benzaldehyde from toluene and benzene; conversion of alcohols into aldehydes and ketones Reactions: oxidation, reduction, oxime and hydrazone formation; Aldol condensation and Family aldol reactions,.Cannizzaro reaction; haloform reaction and nucleophilic addition reactions with RMgX, NaHSO3, HCN, water , alcohol, RSH ,amine and derivatives Carboxylic acids & derivatives: Physical properties; Preparation: from nitriles, Grignard reagents, hydrolysis of esters and amides; Formation of esters, acid chlorides , and amides, Preparation of benzoic acid from alkylbenzenes; Reactions: reduction, halogenation, formation of esters, acid chlorides, anhydrides and amides

MATHEMATICS : Areas & Differential, Equations

Name of the Student: _____   **H.T. NO:** ☐☐☐☐☐☐☐

JEE-ADVANCE-2022-P1-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 Numerical Value Answer Type	+3	0	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)	Matching Type	+3	-1	4	12
Total				**18**	**60**

PHYSICS:

Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 19 – 26)	Questions with Numerical Value Answer Type	+3	0	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)	Matching Type	+3	-1	4	12
Total				**18**	**60**

CHEMISTRY:

Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 37 – 44)	Questions with Numerical Value Answer Type	+3	0	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)	Matching Type	+3	-1	4	12
Total				**18**	**60**

MATHEMATICS   **Max Marks: 60**

SECTION – I
(NUMERICAL VALUE TYPE)

This section contains **EIGHT (08)** questions.
- The answer to each question is a **NUMERICAL VALUE.**
- For each question, enter the correct numerical value of the answer using the mouse and the on-screen virtual numeric keypad in the place designated to enter the answer. If the numerical value has more than two decimal places, **truncate/round-off** the value to **TWO** decimal places.
- Answer to each question will bee evaluated <u>according to the following marking scheme :</u>
Full Marks:+3 **ONLY** if the correct numerical value is entered ;
Partial Mark: 0 In all other cases.

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1. Let $f : R^+ \to R$ be a differentiable function satisfying

$$f(x) = e + (1-x)\,ln\left(\frac{x}{e}\right) + \int_1^x f(t)\,dt \;\; \forall \; x \in R^+.$$ If the area enclosed by the curve

$g(x) = x\left[f(x) - e^x \right]$ lying in the fourth quadrant is A, then find the value of A^{-2}.

2. If the area bounded by the curve $y = \left| cos^{-1}(\sin x) \right| - \left| \sin^{-1}(\cos x) \right|$ and x-axis, where $\dfrac{3\pi}{2} \le x \le 2\pi$,

is equal to $\dfrac{\pi^2}{k}$, where $k \in N,$ then find k.

3. Let $y = f(x) = \begin{cases} \sqrt{x+3}, & -3 \le x < -2 \\ 1 + \sqrt{x+2}, & -2 \le x < -1 \\ 2 + \sqrt{x+1}, & -1 \le x \le 0 \end{cases}$. If $|y| = f\left(-|x|\right)$ be a curve C and area enclosed between

the curve C and the circle $x^2 + y^2 = 5$ equals $p + \pi q,$ where p and q are integers then find the value

of $(p+q)$.

4. Let $d_1\left((x_1, y_1),(x_2, y_2)\right) = |x_1 - x_2| + |y_1 - y_2|$ and

$d_2\left((x_1, y_1),(x_2, y_2)\right) = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$ where d_1, d_2 denotes the distance

between the point (x_1, y_1) and (x_2, y_2) on the co-ordinate plane, then area of the region

enclosed by the set of points (x, y) satisfying,

$d_1\left((x, y),(0,0)\right) \ge 1$ and $d_2\left((x, y),(0,0)\right) \le 1$ is A, then find $[A]$, [.] → G.I.F.

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5. Let $y = f(x)$ be a curve C_1 passing through $(2,2)$ and $\left(8, \frac{1}{2}\right)$ and satisfying a differential

equation $y\left(\frac{d^2 y}{dx^2}\right) = 2\left(\frac{dy}{dx}\right)^2$. Curve C_2 is the director circle of the circle $x^2 + y^2 = 2$. If

the shortest distance between the curves C_1 and C_2 is $\left(\sqrt{p} - q\right)$ where $p, q \in N$, then find

the value of $\left(p^2 - q\right)$.

6. A function $y = f(x)$ satisfies $xf'(x) - 2f(x) = x^4 f^2(x), \forall x > 0$ and $f(1) = -6$. Find the

value of $f'\left(3^{\frac{1}{5}}\right)$.

7. Let f be a continuous function satisfying the equation $\int_0^x f(t)\,dt + \int_0^x t\, f(x-t)\,dt = e^{-x} - 1$,

then find the value of $e^{10} f(10)$.

8. A continuous function $f : R \to R$ satisfy the differential equation $f(x) = (1 + x^2)\left[1 + \int_0^x \frac{f^2(t)}{1+t^2}\,dt\right]$ then

the value of $\left[f(-2)\right]$ is, $[.] \to GIF$

SECTION – II
(ONE OR MORE CORRECT ANSWER TYPE)

This section contains **SIX (06)** questions.
- Each question has **FOUR** options (A), (B), (C) and (D). **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 <u>according to the following marking scheme :</u>
Full Marks :+4 **ONLY** if (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** two options are 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. The area of the region given by $|x - 2y| + |x + 2y| \le 8$ and $xy \ge 2$ is / are

A) $4(3 - ln\ 4)$ **B)** $4(3 + ln\ 4)$ **C)** $4\left(ln\ \frac{e^3}{4}\right)$ **D)** $4\left(ln\ e^3\right)$

10. Consider the function $f(x)$ and $g(x)$ both defined from $R \to R$ and are defined as

$f(x) = 2x - x^2$ and $g(x) = x^n$, $n \in N$ and if the area between $f(x)$ and $g(x)$ in the first

quadrant is ½, then n is a divisor of

A) 12 **B)** 15 **C)** 20 **D)** 30

11. Let S be the area of the region enclosed by $y = e^{-x^2}$, $y = 0, x = 0$ and $x = 1$. Then

A) $S \geq \dfrac{1}{e}$
B) $S \geq 1 - \dfrac{1}{e}$

C) $S \leq \dfrac{1}{4}\left(1 + \dfrac{1}{\sqrt{e}}\right)$
D) $S \leq \dfrac{1}{\sqrt{2}} + \dfrac{1}{\sqrt{e}}\left(1 - \dfrac{1}{\sqrt{2}}\right)$

12. If $x^m + y^m = c.x^n$ is the solution of $\left(x^3 - 2y^3\right)dx + 3xy^2 dy = 0$, then

A) $m - n = 1$ **B)** $m + n = 5$ **C)** $m = 3, n = 2$ **D)** $2m = 3n$

13. Let function $y = f(x)$ satisfies the differential equation $x^2 \dfrac{dy}{dx} = y^2 e^{\frac{1}{x}}$, $(x \neq 0)$ and

$\lim\limits_{x \to 0^-} f(x) = 1$. Identify the correct statement(s):

A) Range of $f(x)$ is $(0,1) - \left\{\dfrac{1}{2}\right\}$
B) $f(x)$ is bounded

C) $\lim\limits_{x \to 0^+} f(x) = 1$
D) $\displaystyle\int_0^e f(x)\,dx > \int_0^1 f(x)\,dx$

14. A function $y = f(x)$ satisfying the differential equation $\sin x \dfrac{dy}{dx} - y\cos x + \dfrac{\sin^2 x}{x^2} = 0$ is such

that $y \to 0$ as $x \to \infty$ then which of the following statement is/are correct:

A) $\lim\limits_{x \to 0} f(x) = 1$
B) $\displaystyle\int_0^{\pi/2} f(x)\,dx$ is less than $\pi/2$

C) $\displaystyle\int_0^{\pi/2} f(x)\,dx$ is greater than unity
D) $f(x)$ is an odd function

SECTION – III
(MATCHING TYPE)

This section contains **FOUR (04)** Matching List Sets.
- Each set has **ONE** Multiple Choice Question.
- Each set has **TWO** lists :**List-I** and **List-II.**
- **List-I** has **Four** entries (I), (II), (III) and (IV) and **List-II** has **Five** entries (P), (Q), (R), (S) and (T).
- **FOUR** options are given in each Multiple Choice Question based on **List-I** and **List-II** and **ONLY ONE** of these four options satisfies the condition asked in the Multiple Choice Question.
- Answer to each question will be evaluated <u>according to the following marking scheme :</u>

Full Marks:+3 **ONLY** if the option corresponding to the correct combination is chosen;
Zero Marks: 0 If none of the options is chosed (i.e. the question is unanswered);
Negative Marks: –1 In all other cases.

15.

	Column – I		Column – II
A	Area bounded by $|x|-|y|\geq1$ & $|x|\leq2$ is	**P**	8
B	If $b\in[0,3]$ then the maximum bounded area by curve $y=1-|x-1|$ & $y=|x-b|$ is	**Q**	1/2
C	Area enclosed by $\left[|x|\right]\left[|y|\right]=2$ $[.]\rightarrow$GIF	**R**	1
D	Area bounded by $y=\max\left\{|x-2|+2,\ 3-|x-2|\right\}$ & $y=\min\left\{|x-2|+2,\ 3-|x-2|\right\}$	**S**	2

A) A-S, B-Q, C-P, D-Q   **B)** A-S, B-R, C-Q, D-P

C) A-S, B-P, C-R, D-Q   **D)** A-S, B-Q, C-P, D-R

16.

	Column – I		Column – II
A	The area between the curves $y=2x^4-x^2$, the x-axis and the ordinates of two minimum of the curve is	**P**	$2\sin1$
B	The area bounded by the curve $x=at^2, y=2at$ the x-axis $(1\leq t\leq3)$	**Q**	$7/120$
C	The area of the circle centred at $(1, 2)$ and passing through $(4, 6)$ is	**R**	$\dfrac{104a^2}{3}$
D	The area of the curve bounded by $y=\cos x,\ y=0, |x|=1$ is	**S**	25π

A) A-Q, B-S, C-R, D-P   **B)** A-Q, B-R, C-S, D-P

C) A-Q, B-R, C-P, D-S   **D)** A-Q, B-P, C-S, D-R

17.

	Column – I		Column – II
A	The solution of DE $\left(1+x^2y^2\right)y\,dx+\left(x^2y^2-1\right)x\,dy=0$	**P**	$2ye^{2x}=ce^{2x}-1$
B	The solution of DE $2x^3\,y\,dy+\left(1-y^2\right)\left(x^2y^2+y^2-1\right)dx=0$	**Q**	$4e^{3x}+3e^{-4y}=c$
C	The solution of DE $\dfrac{x+\dfrac{x^3}{3!}+\dfrac{x^3}{5!}+...}{1+\dfrac{x^2}{2!}+\dfrac{x^4}{4!}+...}=\dfrac{dx-dy}{dx+dy}$	**R**	$x^2y^2=2\ln\left(\dfrac{y}{x}\right)+c$
D	The solution of $\ln\left(\dfrac{dy}{dx}\right)=3x+4y$ is	**S**	$x^2y^2=\left(cx-1\right)\left(1-y^2\right)$

A) A-R, B-S, C-Q, D-P   **B)** A-R, B-Q, C-P, D-S

C) A-R, B-S, C-P, D-Q   **D)** A-R, B-R, C-S, D-Q

18. Match the following family of curve with then differential equation

	Column – I		Column – II
A	$y=cx+c^2$	**p**	$y\left(1-\left(\dfrac{dy}{dx}\right)^2\right)=2x\dfrac{dy}{dx}$
B	$y=ae^{2x}+be^{3x}$	**q**	$x\dfrac{d^2y}{dx^2}+2\dfrac{dy}{dx}-xy+x^2-2=0$
C	$y^2=4a\left(x+a\right)$	**r**	$\dfrac{d^2y}{dx^2}-5\dfrac{dy}{dx}+6y=0$
D	$xy=ae^x+be^{-x}+x^2$	**s**	$y=x\dfrac{dy}{dx}+\left(\dfrac{dy}{dx}\right)^2$

A) A-r, B-s, C-p, D-q   **B)** A-s, B-r, C-q, D-p

C) A-s, B-q, C-p, D-r   **D)** A-s, B-r, C-p, D-q

PHYSICS   **Max Marks: 60**

SECTION – I
(NUMERICAL VALUE TYPE)

This section contains **EIGHT (08)** questions.
• The answer to each question is a **NUMERICAL VALUE.**
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19. In an explosion a body at rest breaks up in to 3 parts. Two parts having equal masses move in mutually perpendicular directions each with a velocity of 12 m/s. The magnitude of velocity of the third part which has 3 times mass of each part is given by $\dfrac{N}{\sqrt{2}}$. Find the value of N.

20. In an in-elastic collision between two identical bodies, the first body moves with a velocity $\dfrac{\upsilon}{\sqrt{3}}$ in a direction perpendicular to the initial direction of motion. If υ is the initial velocity of the first body and the second body moves with a speed $\dfrac{2}{\sqrt{x}}$ after collision, find the value of x.

21. In the figure shown below, the magnitude of acceleration of centre of mass of the system is $\left(Take, g = 10ms^{-2}\right)$ $N\sqrt{2}$ Find the value of N
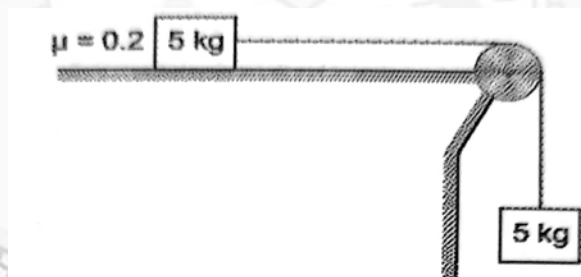
22. Three identical blocks lie at rest along a line on a smooth horizontal surface. The separation between any two adjacent blocks is L. The first block is moved with a velocity υ towards the second block at time $t = 0$. The coefficient of restitution for collision between any two blocks is 1/3. Then the third block will start moving at time $t = N\dfrac{L}{u}$ find the value of N.

23. There are five balls at rest at equal distances in a straight line on a smooth horizontal surface. Their masses are in geometrical progression with common ratio 2 and their coefficients of restitution are each 2/3. If the first ball is started towards the second with velocity u, then the velocity communicated to 5th ball is $u\left(\dfrac{x}{y}\right)^{(y-x)}$. Find the value of $x + y$

24. The coefficient of restitution between a ball and the floor is ½ . If the ball hits the floor at an angle $\theta = 45^0$, find the fraction of its kinetic energy lost in collision (in J).

25. A ball falls freely from a height of 45m When the ball is at a height of 25 m, it explodes into two equal pieces which move horizontally relative to the other with a speed of $10\,ms^{-1}$. The distance between the two pieces when both strike the ground is … in (m)

26. On a smooth horizontal surface, n identical cubical blocks lie at rest parallel to each other along a line. The separation between the near surfaces of any two adjacent blocks is L. The block at one end is given a speed υ towards the next one at time $t = 0$. Given that all collisions are completely inelastic, the last block starts moving at a time $t = x\left[\dfrac{n(n-1)L}{\upsilon}\right]$ Find the value of x.

SECTION – II
(ONE OR MORE CORRECT ANSWER TYPE)

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- Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is(are) correct answer(s).
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Negative Marks : –2 In all other cases.

27. The mass of a man is m and he walks from end A to the other end B of a boat of mass M and length ℓ. The coefficient of friction between man and boat is μ and any resistive force between boat and water is negligible. Choose the correct statement(s)?

A) If the man runs at his maximum acceleration the acceleration of boat is $\frac{m}{M}\mu g$.

B) Minimum time take by man to reach other end of the boat is $\sqrt{\frac{2M\ell}{(M+m)ug}}$.

C) Magnitude of displacement of centre of mass of boat is $\frac{M\ell}{m+M}$.

D) Velocity of CM of man and boat is zero.

28. Two astronauts each have a mass of 75.0 kg are connected by a 10.0 m long rope of negligible mass. They are isolated in space and orbit around common centre of mass with a speed of 5.0 m/s as shown in figure. Then,
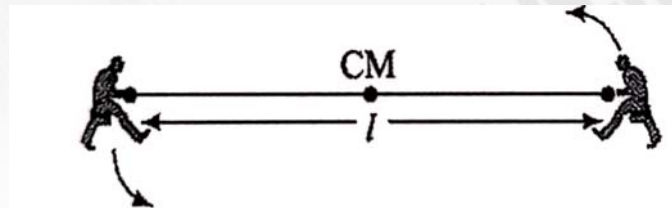
A) Tension in the string will be 375 N
B) tension in the string will be 1500 N

C) acceleration of astronaut will be 5 m/s^2

D) acceleration of astronaut will be 20 m/s^2

29. There are two particles with masses 2 kg and 3 k. They are located at (15, 0) and (0, 20) in $X - Y$ plane. Then the centre of mass lies on lines

A) $y = 2x$ B) $\frac{x}{12} + \frac{y}{24} = 1$ C) $3x - y = 6$ D) $y = x$

30. A man carries a ball of the mass M/2. The mass of man is M and he is initially at rest on a smooth horizontal surface at a distance D from a fixed vertical wall. He throws the ball towards the wall with a velocity V with respect to earth at time t = 0. As a result of throwing, the man also starts moving backwards. The ball rebounds elastically from the wall. The man finally collects the ball. Then choose the correct options.
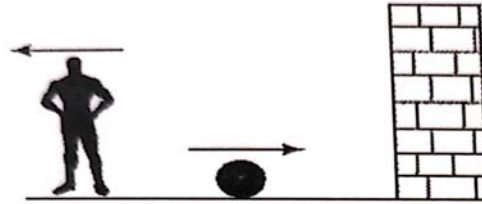
A) The velocity of the man +ball system after the man has collected the ball is $\dfrac{2V}{3}$

B) Impulse by ball on man is $\dfrac{MV}{3}$

C) Impulse by ball on man is $\dfrac{MV}{6}$

D) He catches the ball again at $t = \dfrac{4D}{V}$.

31. In the figure shown the system is at rest initially. Two persons 'A' and 'B' of masses 40 kg each move with constant speeds v_1 and v_2 respectively towards each other on a plank lying on a smooth horizontal surface as shown in figure. The plank travels a distance of 20 m towards right direction in 5 sec (Here v_1 and v_2 are magnitude of velocities with respect to the plank). Then the possible condition (s) can be
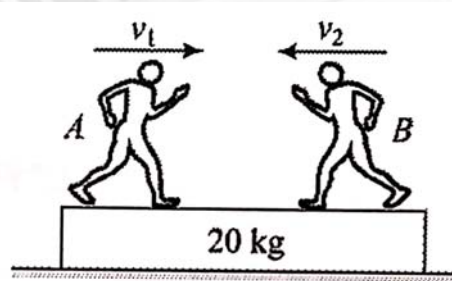
A) $v_1 = 0\,m/s, v_2 = 10\,m/s$ B) $v_1 = 5\,m/s, v_2 = 15\,m/s$

C) $v_1 = 10\,m/s, v_2 = 20\,m/s$ D) $v_1 = 2\,m/s, v_2 = 12\,m/s$

32. The figure shows collision between two masses M and 3M on a smooth horizontal surface. Before the collision the mass M has a velocity V_1 in the y-direction. The mass 3 M has a velocity $(5/12) V_0$ making an angle θ to the x-axis as shown. After the collision the mass 3 M comes to rest and the mass M moves along the x-axis with the velocity V_1' (see fig(2)). Then, neglecting gravity, (Given $\sin\theta = 3/5$) choose the correct options.

(1)   (2)
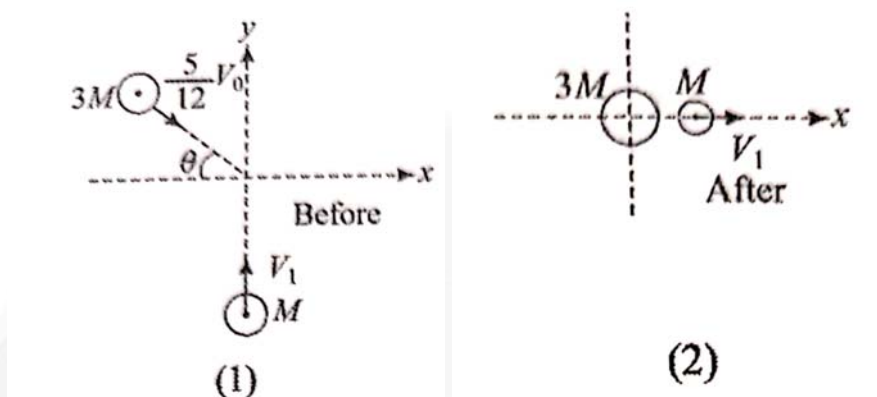
A) the speed V_1 of mass M before collision is $\dfrac{3}{4}V_0$

B) the speed V_1 of mass M before collision is $\dfrac{V_0}{4}$

C) the speed V_1' of mass M after collision is $\dfrac{V_0}{2}$.

D) the speed V_1' of mass M after collision is V_0.

SECTION – III
(MATCHING TYPE)

This section contains **FOUR (04)** Matching List Sets.
- Each set has **ONE** Multiple Choice Question.
- Each set has **TWO** lists :**List-I** and **List-II.**
- **List-I** has **Four** entries (I), (II), (III) and (IV) and **List-II** has **Five** entries (P), (Q), (R), (S) and (T).
- **FOUR** options are given in each Multiple Choice Question based on **List-I** and **List-II** and **ONLY ONE** of these four options satisfies the condition asked in the Multiple Choice Question.
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Negative Marks: –1 In all other cases.

33. The masses of the two blocks A and B are 2 m and 3 m. They are placed on smooth horizontal surface and are connected by a light spring. The two blocks are given velocities as shown when the spring is relaxed.
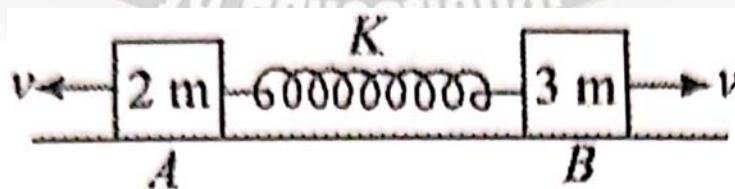
	Column – I		Column – II
A	Minimum magnitude of velocity of $A\left(V_{A\min}\right)$ during motion	P	v
B	Maximum magnitude of velocity of $A\left(V_{A\max}\right)$ during motion	Q	$\dfrac{v}{5}$
C	Maximum magnitude of velocity of $B\left(V_{B_{\max}}\right)$ during motion	R	0
D	Velocity of centre of mass $\left(v_{cm}\right)$ of the system comprised of blocks A, B and spring	S	$\dfrac{7v}{5}$
		T	$\dfrac{v}{3}$
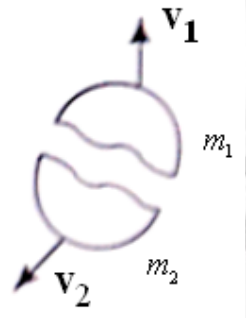
A) A-R; B-S; C-P; D-Q **B)** A-R; B-S; C-Q; D-P

C) A-R ;B-Q; C-S; D-P **D)** A-S ;B-R ; C-Q; D-P

34. A body moving towards right explodes into two pieces 1 and 2 as indicated. Then match directions of motion of the pieces is shown in column I and possible mass ratio are shown in column II.

Column I		Column II	
A)		P)	$m_1 > m_2$

B)		**Q)**	$m_1 = m_2$
C)		**R)**	$m_1 < m_2$
D)		**S)**	Impossible for any masses
		T)	$m_1 = 2m_2$

A) A-S; B-S; C-P; D-P Q R   **B)** A-P; B-P; C-S; D-S

C) A-P; B-Q; C-PR; D-PQR   **D)** A-P; B-S; C-P; D- P Q R

35. Two men of mass 60 kg and 80 kg stand on a plank of mass 20 kg as shown in the figure. Both of them can jump with a velocity of 1 m/s relative to the plank. In each event shown in column-I, find the velocity of plank after the event.
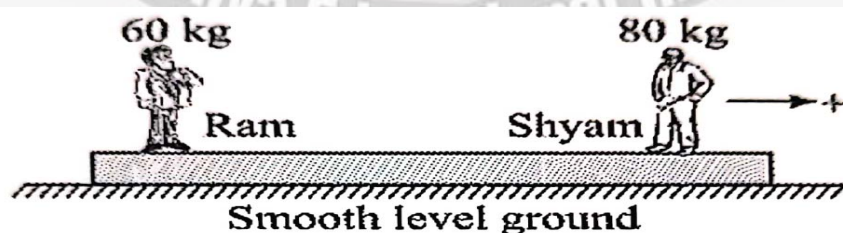
Column I	Column II
A) Ram alone jumps to the left	**p)** $-\dfrac{17}{40}$ m/s
B) Shyam alone jumps to the right	**q)** $-\dfrac{1}{2}$ m/s
C) Ram jumps to left and Shyam jumps to right simultaneously	**r)** $-\dfrac{3}{8}$ m/s
D) Ram jumps to left and after that Shyam jumps to right	**s)** $-\dfrac{1}{8}$ m/s
	(t) 0
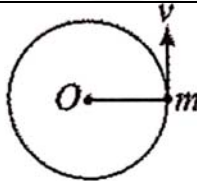
A) a-q; b-r c-p; d-s   **B)** a-r; b-q ; c-p; d-s
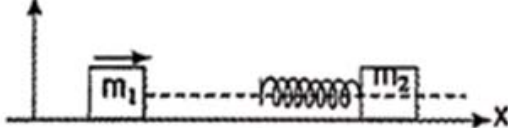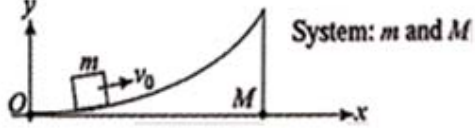
C) a-r; b-q ; c-s; d-p   **D)** a-q; b-p; c-s; d-r

36

Column I		Column II
A) Linear momentum of system is conserved throughout in x – direction	**p**	Uniform circular motion on horizontal plane
B) Potential energy of system is conserved throughout	**q**	Particle projected with initial velocity and undergoing circular motion in vertical plane

C) Mechanical energy of system	r	 Two bodies moving in circular path $(m_1 \& m_2)$ under their mutual attraction force
D) Kinetic energy of system is conserved throughout	s	 System: $m_1 \& m_2$ and spring Block m_1 collides with spring fixed to m_2 and compressing it Surfaces are frictionless.
	t	 M moving on frictionless wedge and M which is kept on frictionless surface.

A) a-r s t; b-p r; c-p q r s t; d-p r   **B)** a- p q; b-p r t; c- r s t;   d-r s

C) a- p q t ; b- p q r ; c-s t; d- p s t   **D)** a- p r s; b-r s t;   c- p q ;   d- r s t

CHEMISTRY   **Max Marks: 60**

SECTION – I
(NUMERICAL VALUE TYPE)

This section contains **EIGHT (08)** questions.
- The answer to each question is a **NUMERICAL VALUE.**
- For each question, enter the correct numerical value of the answer using the mouse and the on-screen virtual numeric keypad in the place designated to enter the answer. If the numerical value has more than two decimal places, **truncate/round-off** the value to **TWO** decimal places.
- Answer to each question will bee evaluated <u>according to the following marking scheme :</u>
Full Marks:+3 **ONLY** if the correct numerical value is entered ;
Partial Mark: 0 In all other cases.

37.

(A)   (B)   (C)   (D)   (E)

(F)   (G)   (H)   (I)   (J)
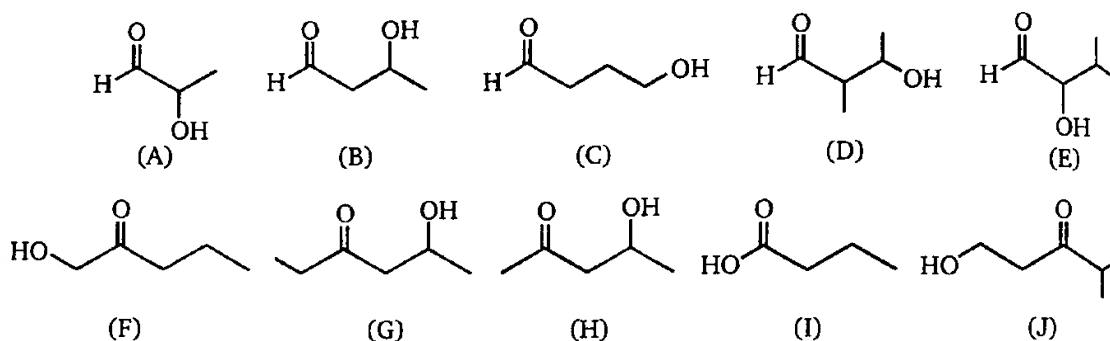
X = Number of compound obtained by Aldol reaction

Y = Number of compounds react with $NaHCO_3$

Sum of X + Y is_____

38. How many of the following compounds will produce idoform reaction when treated with $I_2/NaOH$ solution?

(I)   (II) CH_3CH_2OH (III) CH_3CH_2CHO (IV) CH_3CHO (V)

(VI)   (VII)   (VIII)   (IX)

39.

$$CH_3 - \overset{\overset{\displaystyle O}{\|}}{C} - CH_3 + x\,HCHO \xrightarrow{KOH}$$

(product: central $C=O$ with $HO-$, HO, HO groups on left and $-OH$, OH, HO groups on right)
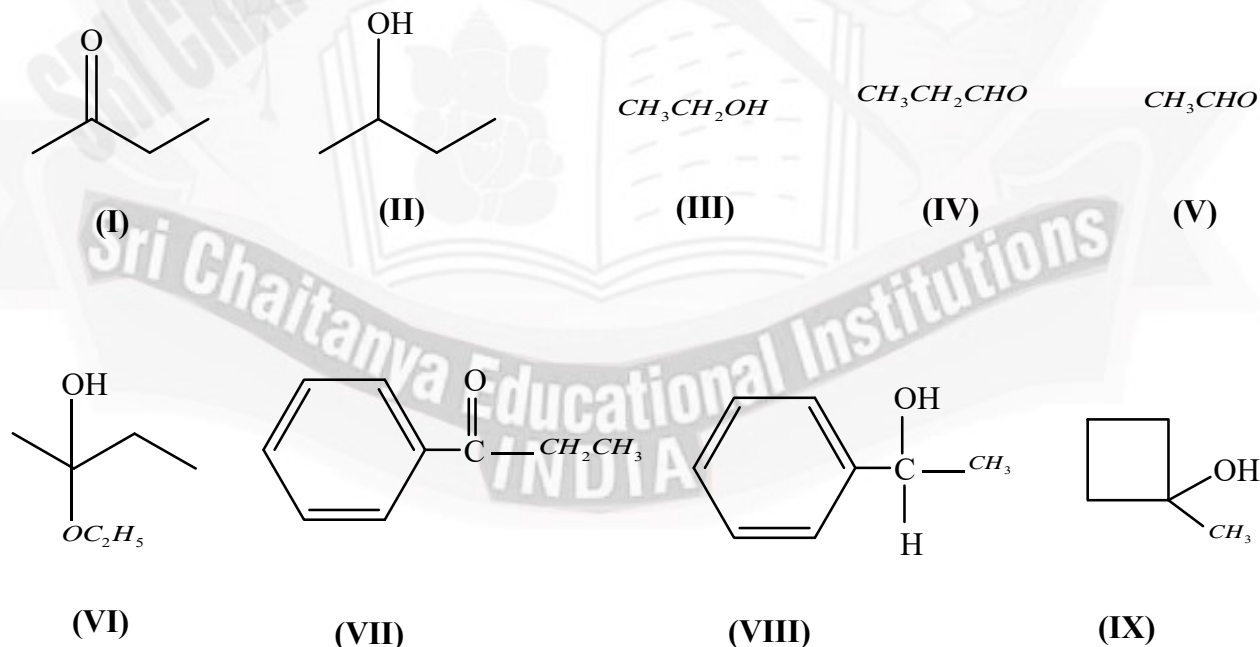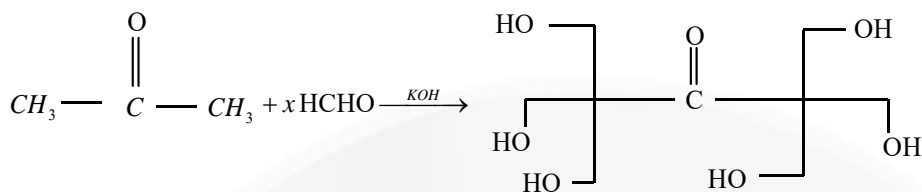
x = moles of HCHO consumed.

Value of (x) will be

40. How many of The given compounds are more reactive to ward nucleophilic addition

reaction than $CH_3 - \overset{\overset{\displaystyle O}{\|}}{C} - Et$

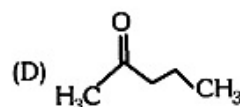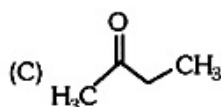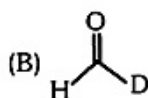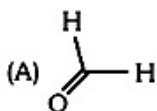(Structures: p-nitrobenzaldehyde (CHO with NO$_2$ para); benzaldehyde (CHO); benzophenone type $C=O$ attached to Ph; p-methoxybenzaldehyde (CHO with OMe para))
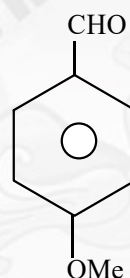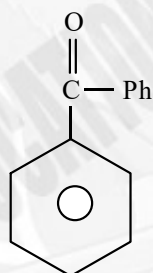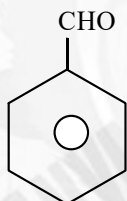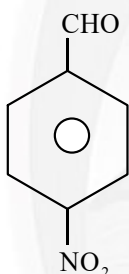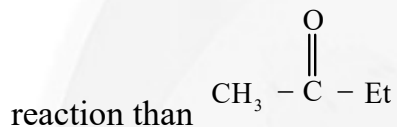
41. Identify that compounds that give Cannnizzaro reaction.

(A) formaldehyde (H–CHO)

(B) HCHO with D (H, C=O, D)

(C) $H_3C - \overset{\overset{\displaystyle O}{\|}}{C} - CH_3$ ... CH$_3$ (methyl ethyl ketone type)

(D) $H_3C - \overset{\overset{\displaystyle O}{\|}}{C} - CH_2 - CH_3$

(E) benzaldehyde (Ph–CHO)

(F) 2-methylcyclohexanone (H$_3$C, ketone)

(G) bicyclic ketone

(H) furan-2-carbaldehyde (O-ring with CHO)

(I) OHC—CHO

(J) $CH_3 - CH_2 - \overset{\overset{\displaystyle O}{\|}}{C} - CH_3$

(K) cyclopentanone

(L) $H - \overset{\overset{\displaystyle O}{\|}}{C} - CH(CH_3) - CH_3$ (isobutyraldehyde)

(M) CH$_3$—CH(CH$_3$)—C(=O)—CH$_2$—CH$_3$

(N) CH$_3$—C(=O)—CH(CH$_3$)—CH$_2$—CH$_3$
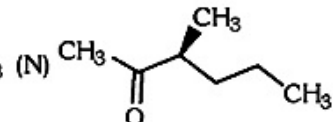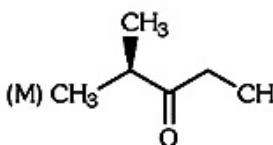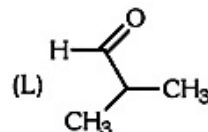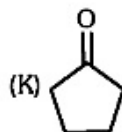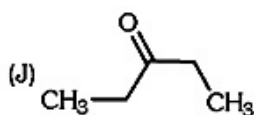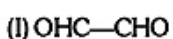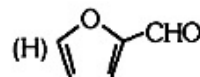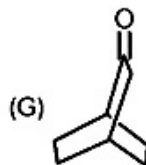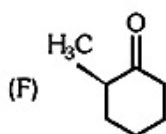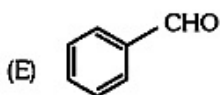
42. How many different type of carbonyl compounds, that can be obtained by ozonolysis of $m-$xylene

$$\xrightarrow[OH^-\Delta]{N_2H_4} A$$
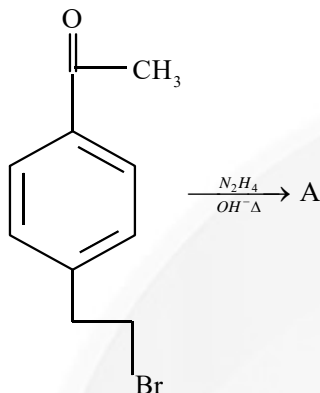
43. Degree of unsaturation In the product A

44. Total number of $CO_2(\uparrow)$ released in following process.

$$\xrightarrow[ii)\ \Delta]{i)\ H_3O^+}$$

SECTION – II
(ONE OR MORE CORRECT ANSWER TYPE)

This section contains **SIX (06)** questions.
- Each question has **FOUR** options (A), (B), (C) and (D). **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 <u>according to the following marking scheme :</u>
Full Marks :+4 **ONLY** if (all) the correct option(s) is(are) chosen;
Partial Marks: +3 If all the four options are correct but **ONLY** three options are chosen;
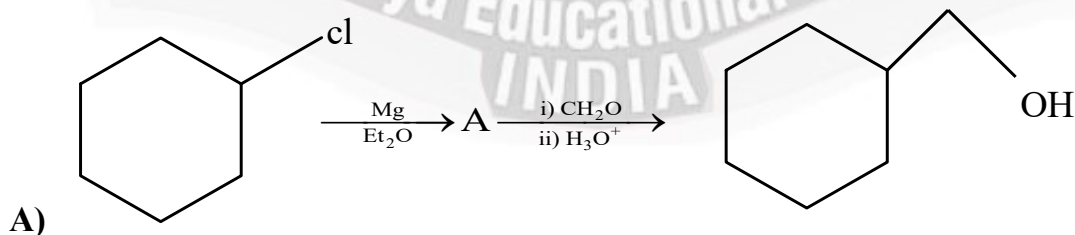*Partial Marks*: +2 If three or more options are correct but **ONLY** two options are chosen, both of which are correct ;
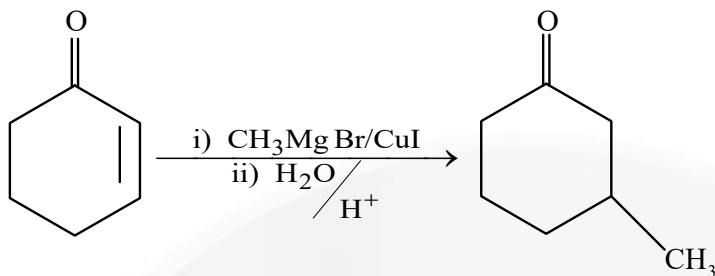*Partial Marks*: +1 If two or more options are correct but **ONLY** two options are chosen, and it is a correct option ;
Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered);
Negative Marks : –2 In all other cases.

45. Which of the following reactions is/are correct match

A)

$$\xrightarrow[Et_2O]{Mg} A \xrightarrow[ii)\ H_3O^+]{i)\ CH_2O}$$

B)
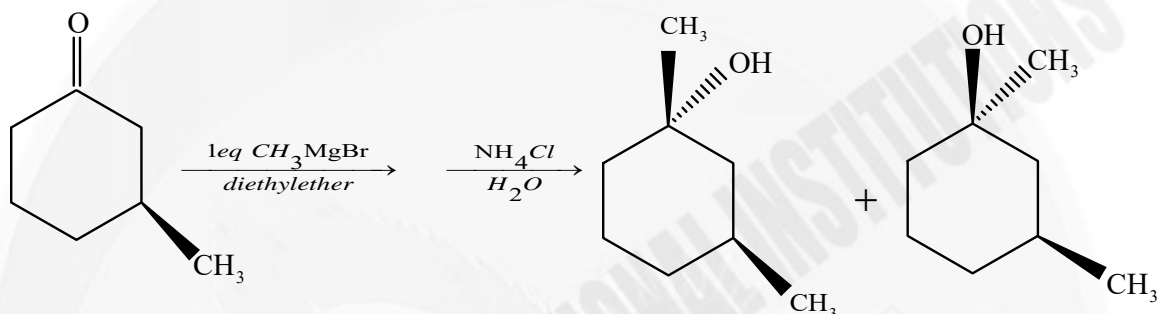
C)
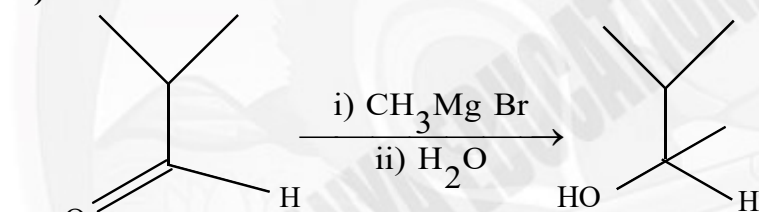
D)

46. Which of the following reaction is/are correct match

A)

A and B is differentiated by Tollen's reagent

B)

product is Racemic mixture

C)

$$\text{propene} \xrightarrow[\text{ii) } HgSO_4]{\text{i) } H_2SO_4 / H_2O} A \xrightarrow{NaBH_4} \text{2-Propanol}$$
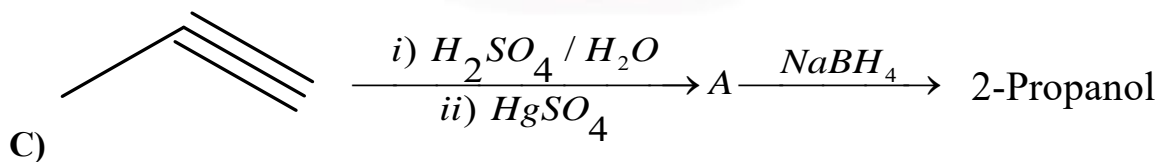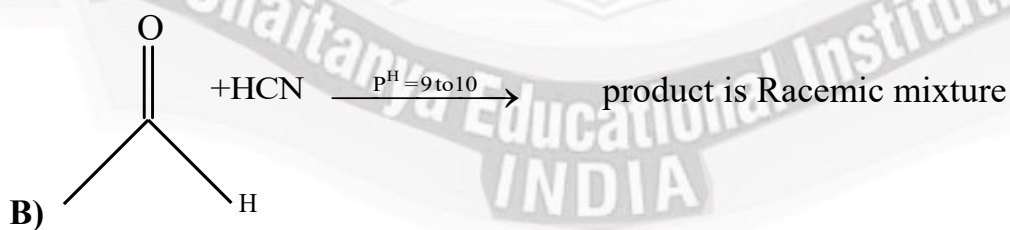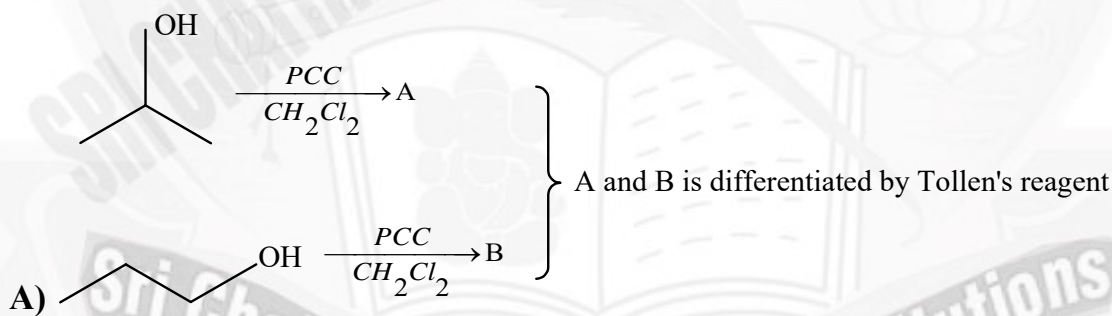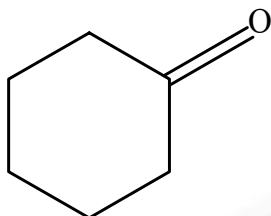
form stable Hydrate

D)

47. How many of the following compounds give Cannizaro reaction

A) $H - C - D$ **B)** **C)** **D)**
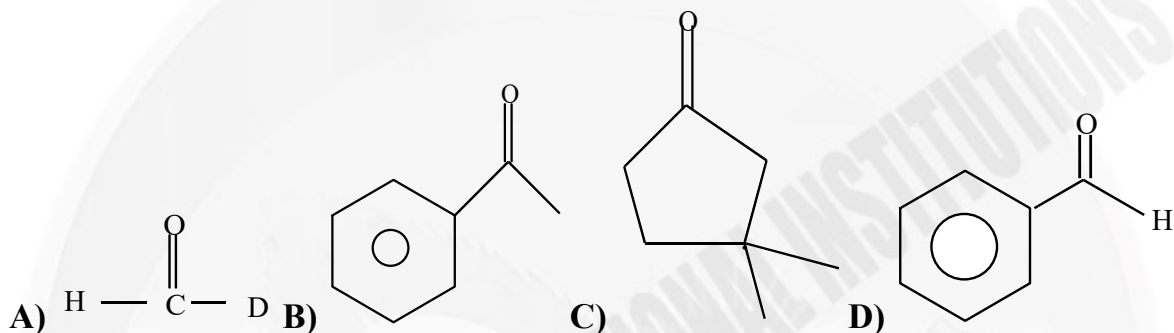
48. Which of the following does from a stable Hydrate on addition of H_2O

A) $Ph - C - C - C - Ph$ **B)**

C) **D)**
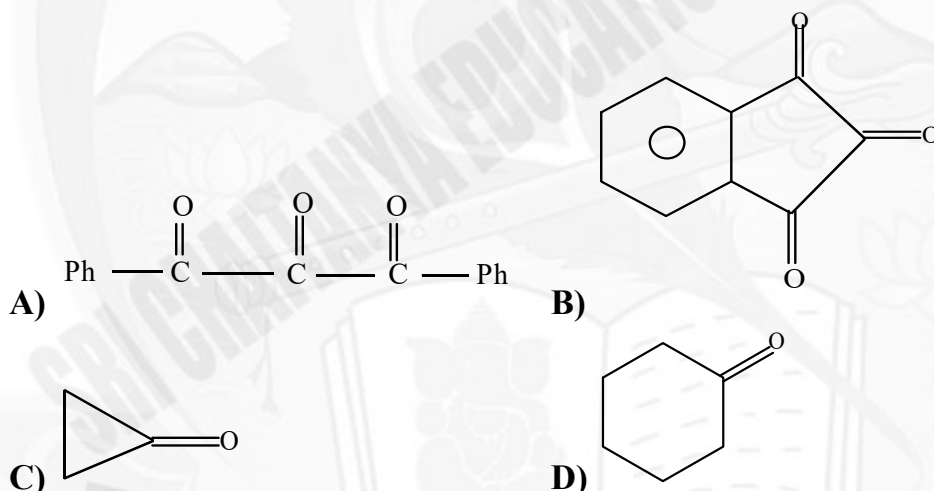
49. Which of the following is the product of an intra molecular Aldol condensation?

A) **B)** **C)** **D)**
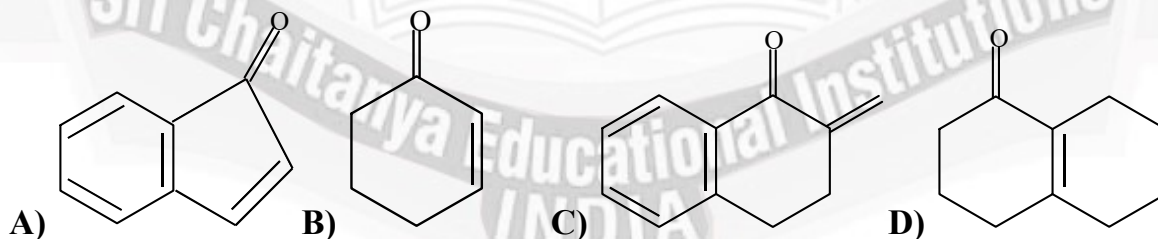
50. How many β-keto Acids will easily undergo decarboxylation

A)

B)

C) ph

D)

SECTION – III
(MATCHING TYPE)

This section contains **FOUR (04)** Matching List Sets.
- Each set has **ONE** Multiple Choice Question.
- Each set has **TWO** lists : **List-I** and **List-II.**
- **List-I** has **Four** entries (I), (II), (III) and (IV) and **List-II** has **Five** entries (P), (Q), (R), (S) and (T).
- **FOUR** options are given in each Multiple Choice Question based on **List-I** and **List-II** and **ONLY ONE** of these four options satisfies the condition asked in the Multiple Choice Question.
- Answer to each question will be evaluated <u>according to the following marking scheme :</u>
Full Marks:+3 **ONLY** if the option corresponding to the correct combination is chosen;
Zero Marks: 0 If none of the options is chosed (i.e. the question is unanswered);
Negative Marks: –1 In all other cases.

51. Math the column (I) and (II) Matrix.

	Column(I) Reaction		Column (II) products formed
A)	CH_3 HO_2C ——————— CO_2H H ——————— D $\xrightarrow{\Delta}$ ph	**p)**	Diastereomers
B)	CH_3 HO_2C ——————— CO_2H $\xrightarrow{\Delta}$ Et	**q)**	Racemic mixture

| C) | | r) | Meso compound |
| D) | | s) | CO_2 gas will evolve |

A) A-ps, B-qs, C-ps, D-r   B) A-ps, B-qs, C-pq, D-r
C) A-ps, B-qs, C-pr, D-s   D) A-ps, B-pq, C-pr, D-s

52.   Match the column:

	Column (I) Conversion		Column (II) Reagent
A)		p)	$NH_2/NH_2/HO^{\ominus}, \Delta$ (Wolf – kishner reduction)
B)		q)	$Zn(Hg), HCl$ (Clemmensen reduction)
C)		r)	$LiAlH_4$
D)		s)	None

A) A-q, B-p, C-s, D-r   B) A-q, B-s, C-r, D-p

C) A-q, B-s, C-p, D-r   D) A-q, B-r, C-s, D-p

53. Math the column I and II. (Matrix)

	Column – I			Column – II
A	$PhMgBr + (A) \xrightarrow[H^+]{} 1^o alcohol$	**P**		$CH_3 - \overset{O}{\overset{\|}{C}} - CH_2 \ \overset{O}{\overset{\|}{C}} - CH_3$
B	$PhMgBr + (B) \xrightarrow[H^+]{} 2^o alcohol$	**Q**		$CH_3 - \overset{O}{\overset{\|}{C}} - CH_3$
C	$PhMgBr + (C) \xrightarrow[H^+]{} 3^o alcohol$	**R**		$CH_3 - \overset{O}{\overset{\|}{C}} - H$
D	$PhMgBr + (D) \xrightarrow[H^+]{} \bigodot$	**S**		$H - \overset{O}{\overset{\|}{C}} - H$

A) A-s, B-r, C-p, D-q   **B)** A-s, B-q, C-r, D-p

C) A-s, B-r, C-q, D-p   **D)** A-s, B-r, C-p, D-r

54. Match the column:

	Column – I		Column – II
A	$\xrightarrow[ii) \ aq \ NH_4Cl]{i) \ LiAlH_4}$	**P**	racemic mixture
B	$\xrightarrow[(2)H^+]{(1)KCN}$	**Q**	Diastereomers
C	$Ph - CH_2 - Cl \xrightarrow{KCN}$	**R**	Nu-addition reaction
D	$\xrightarrow[(2)H^+]{(1)CH_3MgBr}$	**S**	Nu-Substitution reaction

A) A-pr, B-r, C-s, D-pr   **B)** A-pr, B-s, C-r, D-ps

C) A-pr, B-r, C-s, D-pq   **D)** A-pr, B-r, C-r, D-pr

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19	MOULIK JINDAL	HT.No. 237021004
22	D PRATAP SINGH	HT.No. 232006139 (svt)
23	SHAIK SAHIL CHANDA	HT.No. 236132870
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67	GUNDA SUSHANTH	HT.No. 236129732
68	HARSH TAYA	HT.No. 237021178
69	KRISH GUPTA	HT.No. 232068189 (svt)
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81	N DHARMA TEJA REDDY	HT.No. 236050138
84	S VENKAT KOUNDINYA	HT.No. 236130679
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