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 NUCLEUS-BT	**JEE-MAIN**	**Date: 14-06-2025**
Time: 09.00Am to 12.00Pm	**WTM-32**	**Max. Marks: 300**

IMPORTANT INSTRUCTION:

1. Immediately fill in the Admission number on this page of the Test Booklet with **Blue/Black** Ball Point **Pen** only.
2. The candidates should not write their Admission Number anywhere (except in the specified space) on the Test Booklet/ Answer Sheet.
3. The test is of **3 hours** duration.
4. The Test Booklet consists of 90 questions. The maximum marks are **300.**
5. There are **three** parts in the question paper 1,2,3 consisting of **Physics, Chemistry** and **Mathematics** having **30 questions** in each subject and subject having **two sections.**

   (I) Section –I contains 20 **multiple choice** questions with only one correct option.

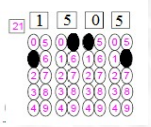
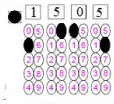
   Marking scheme: +4 for correct answer, 0 if not attempt and -1 in all other cases.

   (II) Section-II contains 10 **Numerical Value Type** questions. Attempt any 5 questions only, if more than 5 questions attempted, First 5 attempted questions will be considered.

   - The Answer should be within **0 to 9999.** If the Answer is in **Decimal** then round off to the **nearest Integer** value (Example i,e. If answer is above **10** and less than **10.5** round off is **10** and If answer is from **10.5** and less than **11** round off is **11).**

   To cancel any attempted question bubble on the question number box.

   For example: To cancel attempted question 21. Bubble on 21 as shown below

Question Answered for Marking **Question Cancelled for Marking**

Marking scheme: +4 for correct answer, 0 if **not attempt** and **-1** in all other cases.

6. Use **Blue / Black Point Pen only** for writing particulars / marking responses on the Answer Sheet. **Use of pencil is strictly prohibited.**
7. No candidate is allowed to carry any textual material, printed or written, bits of papers, mobile phone any electron device etc, except the Identity Card inside the examination hall.
8. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
9. On completion of the test, the candidate must hand over the Answer Sheet to the invigilator on duty in the Hall. **However, the candidate are allowed to take away this Test Booklet with them.**
10. **Do not fold of make any stray marks on the Answer Sheet**

Name of the Candidate (in Capital): _____

Admission Number: | | | | | | | | | |

Candidate's Signature:_____ **Invigilator's Signature:** _____

14-06-2025_Sr.Super60_NUCLEUS-BT_Jee-Main-WTM-32_Test Syllabus

MATHEMATICS : Principle of inclusion and exclusion, Derangement,
Number of function from A to B (one-one, onto, decreasing and increasing functions), Division of different things into groups, Ball and Box problems, Distribution of identical / distinct objects into identical / distinct boxes (number of integral solutions), Exponent of prime in n!, nc_r

PHYSICS : PHOTO ELECTRIC EFFECT: Electron emission, Photoelectric effect: A historical account of its discovery, Experimental study of photoelectric effect, Laws of photoelectric emission, Photoelectric effect and wave theory of light, Einstein's photoelectric equation, Experimental verification of Einstein's photoelectric equation, Radiation Force and Radiation Pressure, PHOTO ELECTRIC EFFECT: Electron emission, Photoelectric effect: A historical account of its discovery, Experimental study of photoelectric effect, Laws of photoelectric emission, Photoelectric effect and wave theory of light, Einstein's photoelectric equation, Experimental verification of Einstein's photoelectric equation, Radiation Force and Radiation Pressure, Electron Volt: A Unit of Energy, DUAL NATURE OF RADIATION AND MATTER: Particle nature of light: the photon, Wave nature of matter, The de Broglie waves or matter waves, Wave length of an electron, Variation of mass With Velocity, Mass-Energy Equivalence, Davisson-Germer experiment, Experimental verification of de Broglie wave equation (Deleted pertaining to JEE MAINS but still in JEE ADV Syllabus), Matter waves and Heisenberg's uncertainity principle

CHEMISTRY : Robinson's annulation, Oxidation and reduction: Clemmensen's reduction, Wolf-Kishner reduction, Tests for aldehydesand ketones: Fehling's test, Benedict's test, Tollen's test, Schiff's test, Haloform test, Brady's test,, Oxidation by SeO2,conjugate addition, CARBOXYLIC ACIDS: preparation, properties & Reactions, Physical properties; Preparation: from nitriles, Grignard reagents, hydrolysis of esters and amides ;Preparation of benzoic acid from alkylbenzenes; Reactions: reduction, halogenation, formation of esters, acid chlorides and amides.

MATHEMATICS

Max Marks: 100

SECTION-I
(SINGLE CORRECT ANSWER TYPE)

This section contains **20 Multiple Choice Questions.** Each question has 4 options (1), (2), (3) and (4) for its answer, out of which ONLY ONE option can be correct.

Marking scheme: +4 for correct answer, 0 if not attempted and –1 in all other cases.

1. Number of permutations of letters of the word "VICTORY" neither start with "V" nor end with "Y"

1) 1320 **2)** 5040 **3)** 3720 **4)** 1440

2. Number of Linear arrangements of 2 different Maths and 2 different Physics books such that same subject must not be together

1) 16 **2)** 8 **3)** 15 **4)** 20

3. Select one natural number from the set {1, 2, 3,…., 100}. Number of possibles such that selected number is neither divisible by "7" nor divisible by "3"

1) 47 **2)** 57 **3)** 43 **4)** 53

4. Number of De-arrangements of a set {1, 2, 3, 4, 5} map to $\{a_1, a_2, a_3, a_4, a_5\}$ such that '1' mapped to a_2

1) 9 **2)** 11 **3)** 44 **4)** 10

5. In how many ways 5 letters can be placed in 5 corresponding envelops (one to each) such that at least 2 letters go to relative envelops

1) 44 **2)** 89 **3)** 31 **4)** 120

6. In how many ways 6 letters can be placed in 6 relative envelops such that at most 3 letters are placed in wrong envelops (one to each)

1) 40 **2)** 55 **3)** 44 **4)** 56

7. Number of functions from A = {1, 2, 3} to B = {a, b, c, d} is _____

1) 4^3 **2)** 3^4 **3)** 4_{P_3} **4)** 4_{C_3}

8. Number of one - one functions from A = {1, 2, 3} to B = {a, b, c, d} is __

1) 4^3 **2)** 3^4 **3)** 4_{P_3} **4)** 4_{C_3}

9. Number of on – to functions from A = {1, 2, 3, 4} to B = {a, b, c} is __

1) 81 **2)** 48 **3)** 64 **4)** 36

10. In how many ways can be a collection of 30 books be divided into two groups of 10 and 20. So that two particular book B_1, B_2 such that B_1 in smaller group, B_2 in bigger group

1) 28_{C_2} **2)** 28_{C_9} **3)** 29_{C_9} **4)** 30_{C_9}

11. There are 10 lamps in a hall. Each one of them can be switched on independently. Find the number of ways in which the hall can be illuminated is

1) 10^2 **2)** 2^{10} **3)** 1023 **4)** 10!

12. If there are 5 periods in each working day of a school, then the number of ways that you can arrange four subjects during the working day is _____

(Every Subject must be there atleast Once)

1) 240 **2)** 220 **3)** 180 **4)** 120

13. In how many ways, 6 different balls can be distributed into 3 boxes such that no box remains empty

1) 729 **2)** 540 **3)** 360 **4)** 150

14. Given below are two Statements:

STATEMENT I: The Total number of Positive integer solutions (X, Y, Z). Such that XYZ = 24 is 30

STATEMENT II: The Total number of Positive integer solutions (X, Y, Z). Such that XYZ = 30 is 27

1) Both **STATEMENT I** and **STATEMENT II** are Correct.

2) **STATEMENT I** is Correct but **STATEMENT II** is Incorrect

3) **STATEMENT I** is Incorrect but **STATEMENT II** is Correct

4) Both **STATEMENT I** and **STATEMENT II** are Incorrect.

15. Match the Statements of the **COLUMN-I** with values of **COLUMN-II**

	COLUMN -I		**COLUMN-II**
I)	The total number of selections of fruits which can be made from 3 identical bananas, 4 identical apples and 2 identical oranges	**P)**	59
II)	In a plane there are 12 Points of which 7 points are Collinear then the number of Triangles can be formed is	**Q)**	185
III)	The number of ways of selecting 10 balls from unlimited number of red, black, white and green balls (let identical balls)	**R)**	286
IV)	The total number of proper Divisors of 38808	**S)**	70

1) I -P; II -Q; III -R; IV -S **2)** I -P; II -Q; III -Q; IV -S

3) I -P; II -R; III -Q; IV -S **4)** I -S; II -R; III -Q; IV -S

16. The number of positive integral solutions of (X, Y, Z, W) so that $X+Y+Z+W=20$

1) 969 **2)** 455 **3)** 1820 **4)** 560

17. The number of non-negative solutions of the equations $X+Y+Z+T=29$, Where $X\geq 1, Y\geq 2, Z\geq 3, T\geq 4$.

1) 1540 **2)** 3876 **3)** 816 **4)** 29

18. The number of non-negative integral solutions of the system of equations $X+Y+Z+T+U=20, X+Y+Z=5$

1) 37 **2)** 336 **3)** 546 **4)** 97

19. Number of Zeros at the end of 100! is _____

1) 97 **2)** 10 **3)** 24 **4)** 100

20. Let $100_{C_{50}}=2^{\alpha}.3^{\beta}.5^{\gamma}.7^{\delta}$..... (Prime power notation) max value of δ is _____

1) 4 **2)** 0 **3)** 16 **4)** 8

SECTION-II
(NUMERICAL VALUE TYPE)

This section contains **5 Numerical Value Type Questions.** The Answer should be within **0 to 9999.** If the Answer is in **Decimal** then round off to the **Nearest Integer** value (Example i,e. If answer is above **10** and less than **10.5** round off is **10** and If answer is from **10.5** and less than **11** round off is **11).**

Marking scheme: +4 for correct answer, 0 if not attempt and -1 in all other cases.

21. Number of ways, 5 identical balls can be distributed into 3 different boxes So that no box remains empty

22. Number of ways, 5 identical balls can be distributed into 3 - identical boxes So that no box remains empty

23. The function of f = {1 2 3 4 5} $\rightarrow$ {1, 2, 3, 4, 5} is an on-to and f(i) $\neq$ i , then number of functions ' f ' is _____

24. A convex n-sided polygon has 44 diagonals then the value of n is _____

25. Number of ways in which 13 identical apples can be distributed among 3 persons so that no two persons receive equal number of apples and each one can receive none (or) one (or) more is ____

PHYSICS **Max Marks: 100**

SECTION-I
(SINGLE CORRECT ANSWER TYPE)

This section contains **20 Multiple Choice Questions.** Each question has 4 options (1), (2), (3) and (4) for its answer, out of which ONLY ONE option can be correct.

Marking scheme: +4 for correct answer, 0 if not attempted and –1 in all other cases.

26. In an experiment on photoelectric effect, the wavelength of the incident radiation is reduced to $\frac{1}{3}rd$ of the initial value and the maximum kinetic energy of the photoelectron is observed to be n times the previous value. The threshold wavelength for the metal plate is (λ is wave length of initial radiation)

1) $\left(\frac{n-1}{n-3}\right)\lambda$ **2)** $\left(\frac{n}{n-3}\right)\lambda$ **3)** $\frac{(n+1)\lambda}{(n-3)}$ **4)** $\frac{\lambda}{n}$

27. When a metallic surface is illuminated with light of wavelength 'λ', stopping potential is V, when the same surface is illuminated by light of wave length 2λ, stopping potential is $\frac{V}{3}$. Threshold wavelength for metallic surface is

1) $\frac{4\lambda}{3}$ **2)** 4λ **3)** 6λ **4)** $\frac{8\lambda}{3}$

28. Related to photoelectric effect, in **COLUMN I**, some physical quantities change while in **COLUMN II** effects of these changes are given. Match the entries of **COLUMN I** with the entries of **COLUMN II**

	COLUMN -I		**COLUMN-II**
I)	Intensity of incident light changes	**P)**	K_{max} of emitted photoelectrons changes
II)	Frequency of incident light changes	**Q)**	Stopping potential changes
III)	Target material changes	**R)**	Saturation current changes
IV)	Potential difference between the emitter and collector changes	**S)**	Time delay in emission of photoelectrons changes

1) I -P; II -Q; III -R; IV -S **2)** I -S; II -Q; III -R; IV -P

3) I -R; II -PQ; III -PQ; IV -S **4)** I -S; II -R; III -Q; IV -S

29. If light of wavelength of maximum intensity emitted from a surface of hot body at temperature T_1 is used to cause photoelectric emission from a metallic surface, then maximum kinetic energy of the emitted photo electron is 6eV, which is 3 times the work function of the metallic surface. If the light of wavelength of maximum intensity emitted from a surface of same body at temperature $T_2\left(T_2 = 2T_1\right)$ is used, the maximum kinetic energy of photoelectrons emitted is (Consider the given body as black body)

1) 2eV **2)** 4eV **3)** 14eV **4)** 18eV

30. The potential energy of a moving particle of mass m is given by $U(x) = \begin{cases} E_0: & 0 \le x \le 1 \\ 0: & x > 1 \end{cases}$

λ_1 and λ_2 are the de-Broglie wavelengths of the particle, when $0 \le x \le 1$ and $x > 1$ respectively. The total energy of the particle is $2E_0$. The ratio $\frac{\lambda_1}{\lambda_2}$ will be

1) 1 **2)** 2 **3)** $\sqrt{2}$ **4)** $\frac{1}{\sqrt{2}}$

31. The work function of a certain metal is $\frac{hC}{\lambda_0}$. When a monochromatic light of wavelength $\lambda < \lambda_0$ is incident such that the plate gains a total power P. If the efficiency of photoelectric emission is η% and all the emitted photoelectrons are captured by a hollow conducting sphere of radius R Already charged to potential V, then neglecting any interaction between plate and the sphere, expression of potential of the sphere at time t is

1) $V + \frac{100\eta\lambda Pet}{4\pi\varepsilon_0 RhC}$ **2)** $V - \frac{\eta\lambda Pet}{400\pi\varepsilon_0 RhC}$ **3)** V **4)** $\frac{\lambda Pet}{4\pi\varepsilon_0 RhC}$

32. Photoelectric effect supports quantum nature of light .Which of the following statement NOT related to quantum nature of light

1) There is a minimum frequency below which no photoelectrons are emitted

2) The maximum kinetic energy of photoelectrons depends only on the frequency of light and not on its intensity

3) Even when the metal surface is faintly illuminated the photoelectrons leave the surface immediately

4) Electric charge of the photoelectrons is quantized

33. A particle of mass 3 m at rest decays into two particles of masses m and $2m$ having non-zero velocities. The ratio of the de-Broglie wavelengths of the particles $\left(\frac{\lambda_1}{\lambda_2}\right)$ is

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

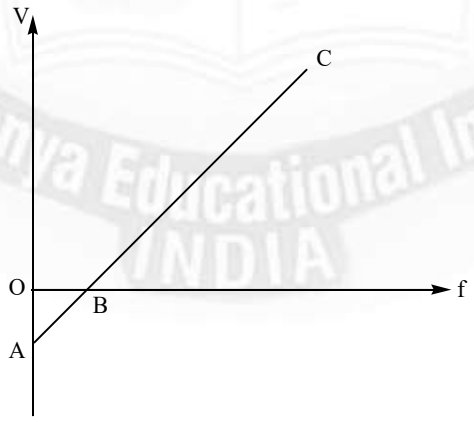
34. A small mirror of mass m is suspended by a light thread of length L. The angle through which the thread will be deflected when a short pulse of laser of energy E falls normally on the mirror is

1) $\theta = \frac{2E}{mc\sqrt{2gl}}$ **2)** $\theta = \frac{mc\sqrt{gl}}{2E}$ **3)** $\theta = \frac{mc\sqrt{2gl}}{2E}$ **4)** $\theta = \frac{2E}{mc\sqrt{gl}}$

35. A regular hexagonal lamina of side a made up of perfectly absorbing material is kept in a region where a parallel beam of light with intensity I having a large aperture falls on it. If the beam makes an angle of 30 with the normal to the plane of hexagon, then the force experienced by the hexagon will be (c velocity of light)

1) $\frac{5a^2I}{4c}$ **2)** $\frac{9a^2I}{4c}$ **3)** $\frac{a^2I}{c}$ **4)** $\frac{6a^2I}{c}$

36. The stopping potential V for photoelectric emission from a metal surface is plotted along Y–axis and frequency of incident light along X–axis. A straight line is obtained as shown. Planck's constant is given by



1) Slope of the line

2) Product of slope of the line and charge on the electron

3) Intercept along Y–axis divided by charge on the electron

4) Product of intercept along X–axis and mass of the electron

37. When a monochromatic point source of light is at a distance of 0.2 m from a photoelectric cell, the stopping potential and the saturation current are respectively 0.6 volt and 18.0 mA. Consider the complete absorption of the incident photons and every photon ejects one electron. If the same source is placed 0.6 m away from the photoelectric cell, then

1) The stopping potential will be 0.2 volt
2) The stopping potential will be 0.8 volt
3) The saturation current will be 6.0 mA
4) The saturation current will be 2.0 mA

38. A parallel beam of light is incident normally on a plane surface absorbing 40% of the light and reflecting the rest. If the incident beam carries 60 watt of power, the force exerted by it on the surface is

1) $3.2\times10^{-8}N$ **2)** $3.2\times10^{-7}N$ **3)** $5.12\times10^{-7}N$ **4)** $5.12\times10^{-8}N$

39. For a cesium surface (Work function 1.80 eV) on an average one electron is emitted for every 10^6 photons that reach the surface. Assuming all the ejected electrons took part in the charge flow, the current from such a surface if it were illuminated with 600nm light from a 2.00 mW laser is

1) $9.68\times10^{-10}A$ **2)** $9.68\times10^{-12}A$ **3)** $1.83\times10^{-12}A$ **4)** zero

40. When a photo metal receives light of frequencies f_1 and f_2 separately, then the maximum velocities of the photoelectrons (of mass m) coming out are v_1 and v_2, respectively, then

1) $v_1-v_2=\left[\frac{2h}{m}(f_1-f_2)\right]^{1/2}$ **2)** $v_1^2-v_2^2=\frac{2h}{m}(f_1-f_2)$

3) $v_1+v_2=\left[\frac{2h}{m}(f_1-f_2)\right]^{1/2}$ **4)** $v_1^2+v_2^2=\frac{2h}{m}(f_1-f_2)$

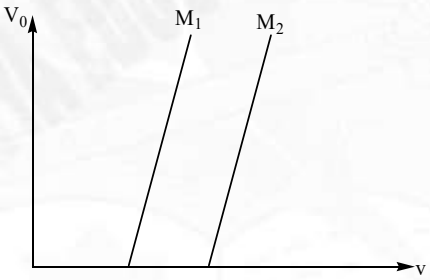
41. Two identical non relativistic particles move at right angles to each other, possessing de Broglie wave lengths λ_1 & λ_2. Find the de Broglie wavelength of each particle in the frame of their centre of mass

1) $\lambda_1 + \lambda_2$ **2)** $\frac{\lambda_1\lambda_2}{\sqrt{\lambda_1^2+\lambda_2^2}}$ **3)** $\frac{\lambda_1\lambda_2}{\lambda_1+\lambda_2}$ **4)** $\frac{2\lambda_1\lambda_2}{\sqrt{\lambda_1^2+\lambda_2^2}}$

42. An electron of mass 'm' with an initial velocity vector $\vec{v} = v_0\,\hat{i}\ (v_0 > 0)$ enters an electric field vector $\vec{E} = -E_0\hat{k}$. If the initial de-Broglie wavelength is λ_0, the value after time *t* would be

1) $\frac{\lambda_o}{\sqrt{1+\frac{e^2E_o^{\,2}t^2}{m^2v_0^{\,2}}}}$ **2)** $\lambda_o\sqrt{1+\frac{e^2E_o^{\,2}t^2}{m^2v_0^{\,2}}}$ **3)** $\frac{\lambda_o}{\sqrt{1-\frac{e^2E_o^{\,2}t^2}{m^2v_0^{\,2}}}}$ **4)** λ_o

43. Given below are two Statements:



STATEMENT I: Figure shows the variation of stopping potential with frequency (*v*) for the two photosensitive materials M_1 and M_2. The slope gives value of $\frac{h}{e}$, where h is Plank's constant, e is the charge of electron.

STATEMENT II: M_2 will emit photoelectrons of greater kinetic energy for the same frequency. In the light of the above statements, choose the most appropriate answer from the options given below

1) Both **STATEMENT I** and **STATEMENT II** are Correct.

2) **STATEMENT I** is Incorrect but **STATEMENT II** are Correct

3) Both **STATEMENT I** and **STATEMENT II** are Incorrect.

4) **STATEMENT I** is Correct but **STATEMENT II** are Incorrect

44. Given below are two Statements:

STATEMENT I: Davisson - Germer experiment establishes the wave nature of electrons.

STATEMENT II: If electrons have wave nature, they can interfere and show diffraction.

1) Both **STATEMENT I** and **STATEMENT II** are Correct.

2) **STATEMENT I** is Incorrect but **STATEMENT II** are Correct

3) Both **STATEMENT I** and **STATEMENT II** are Incorrect.

4) **STATEMENT I** is Correct but **STATEMENT II** are Incorrect

45. Given below are two Statements:

One labelled as **ASSERTION (A)** and other is labelled as **REASON (R).**

ASSERTION (A): The photoelectric effect does not take place, if the energy of the incident radiation is less than the work function of a metal.

REASON (R): Kinetic energy of the photoelectrons is zero, if the energy of the incident radiation is equal to the work function of a metal.

1) Both **A** and **R** are Correct and **R** is the Correct explanation of **A**

2) Both **A** and **R** are Correct and **R** is the not the Correct explanation of **A**

3) **A** is Correct but **R** is not Correct

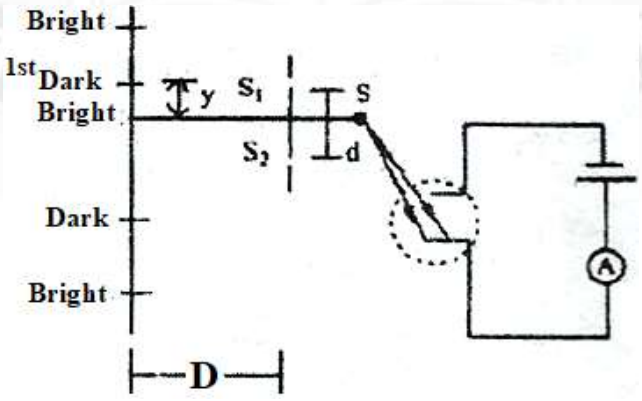
4) **A** is not Correct but **R** is Correct

SECTION-II
(NUMERICAL VALUE TYPE)

This section contains **5 Numerical Value Type Questions.** The Answer should be within **0 to 9999.** If the Answer is in **Decimal** then round off to the **Nearest Integer** value (Example i,e. If answer is above **10** and less than **10.5** round off is **10** and If answer is from **10.5** and less than **11** round off is **11).**

Marking scheme: +4 for correct answer, 0 if not attempt and -1 in all other cases.

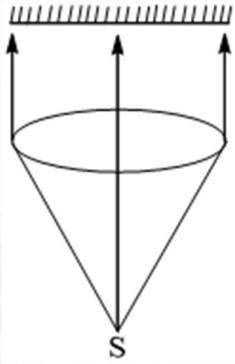
46. In the arrangement shown in the figure, $y = 1.0\,\text{mm}$, $d = 0.24\text{mm}$ and D=1.2m. The work function of the material of the emitter is 2.2 eV. Find the stopping potential V needed to stop the photocurrent $\left(in \times 10^{-1}\text{V}\right)$ $\left(hc = 12400eVA^{\circ}\right)$



47. A $\alpha -$ particle and a proton are accelerated from rest by a potential difference of 100 V. After this their de-Broglie wave lengths are λ_α AND λ_p respectively. The ratio $\frac{\lambda_p}{\lambda_\alpha}$, to the nearest integer is

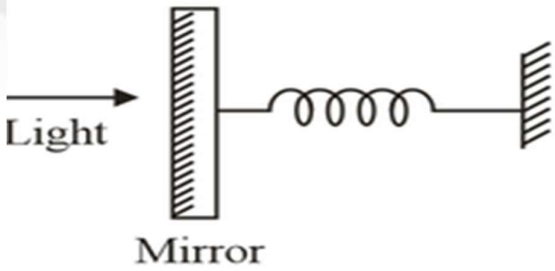
48. A totally reflecting, small plane mirror placed horizontally faces a parallel beam of light as shown in the figure. The mass of the mirror is 20g. Assume that there is no absorption in the lens and that 30% of the light emitted by the source goes through the lens. Find the power $\left(in\times10^8 W\right)$ of the source needed to support the weight of the mirror.

Take $g=10\ m/s^2$.



49. In a photoemission experiment, the maximum kinetic energies of photoelectrons from metals *P, Q* and *R* are E_P, E_Q and E_R, respectively, and they are related by $E_P = 2\ E_Q = 2\ E_R$. In this experiment, the same source of monochromatic light is used for metals *P* and *Q* while a different source of monochromatic light is used for the metal *R*. The work functions for metals *P, Q* and *R* are 4.0 eV, 4.5 eV and 5.5 eV, respectively. The energy of the incident photon used for metal *R*, in eV, is _____

50. A perfectly reflecting mirror of mass *M* mounted on a spring constitutes a spring-mass system of angular frequency Ω such that $\frac{4\pi M\Omega}{h}=10^{24}m^{-2}$, Where h as Planck's constant. *N* photons of wave- length $\lambda=8\pi\times10^{-6}\ m$ strike the mirror simultaneously at normal incidence such that the mirror gets displaced by 1 μm. If the value of N is $x\times10^{12}$, then the value of *x* is_____ (Consider the Spring as massless)



CHEMISTRY **Max Marks: 100**

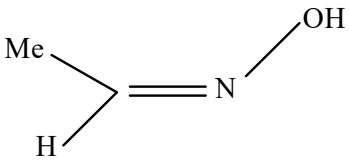
SECTION-I
(SINGLE CORRECT ANSWER TYPE)

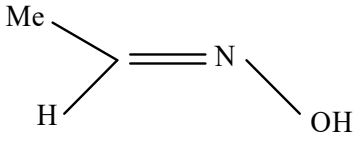
This section contains **20 Multiple Choice Questions.** Each question has 4 options (1), (2), (3) and (4) for its answer, out of which ONLY ONE option can be correct.

Marking scheme: +4 for correct answer, 0 if not attempted and –1 in all other cases.

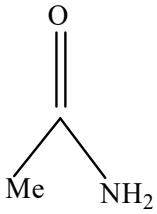
51. $MeCH=O+H_2NOH \xrightarrow{H^+} (C)+H_2O$

(A) (B) ; product (C) is:

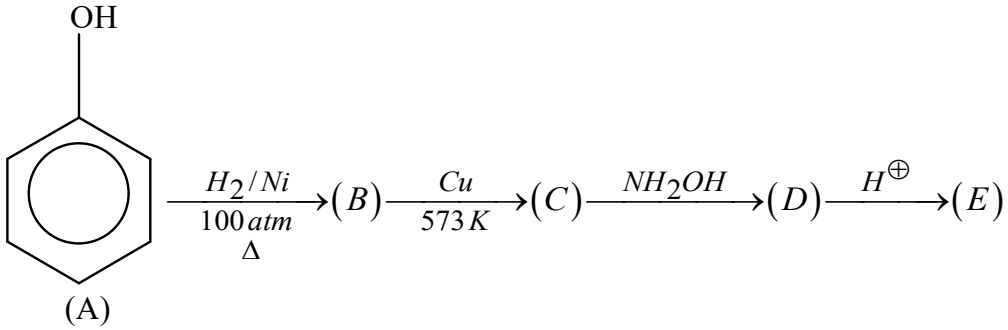
1) 

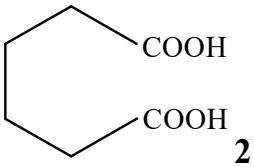
2) 

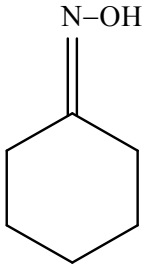
3) $Me-C\equiv N$

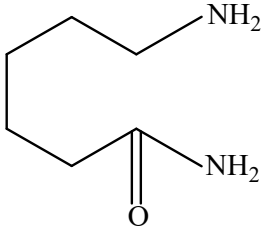
4) 

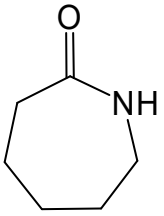
52. The final product (E) in the following reaction is:



1) 

2) 

3) 

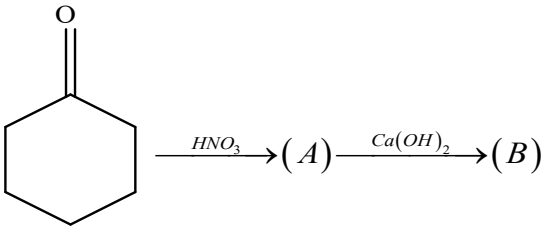
4) 

53. A compound has molecular formula $C_6H_{12}O$. It does not reduce Tollens or Fehling's reagent, but gives a crystalline derivative with 2, 4-dinitro-phenyl hydrazine. With alkali and I_2, it gives yellow solid with a medicinal odour. Clemmensen reduction converts it to 2-methylpentane. The structural formula of the compound is most likely to be:

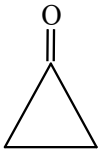
1) $CH_3COCH_2CH\ (CH_3)_2$ **2)** $CH_3CH_2COCH\ (CH_3)_2$

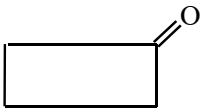
3) $CH_3CH_2CH_2COCH_2CH_3$ **4)** $(CH_3)_2CHCOCH\ (CH_3)_2$

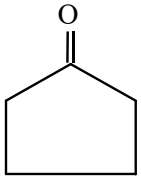
54.

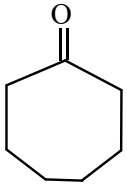


, product (B) in this reaction is:

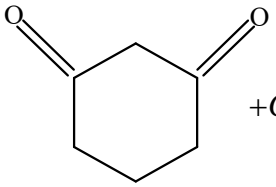
1) 

2) 

3) 

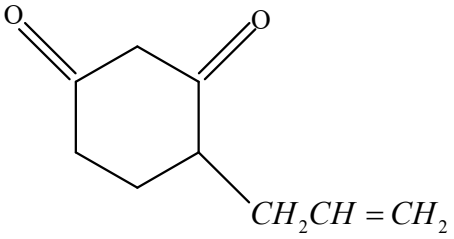
4) 

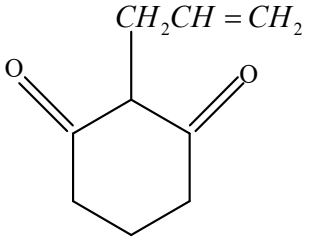
55.

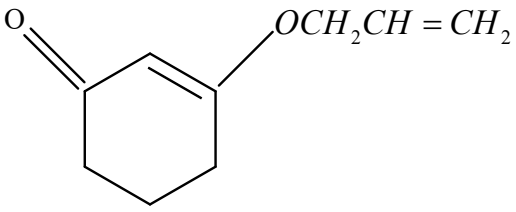


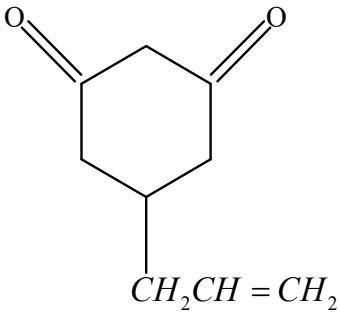
$+CH_2=CHCH_2Br \xrightarrow{KOH} (A);$ (75%),

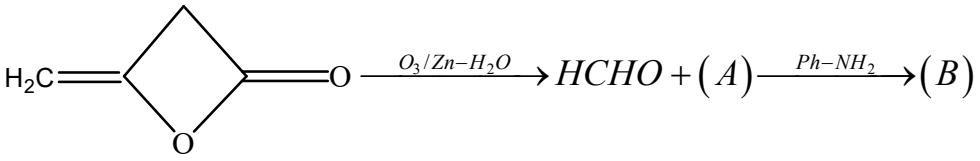
Product (A) is:

1) 

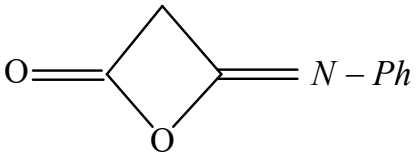
2) 

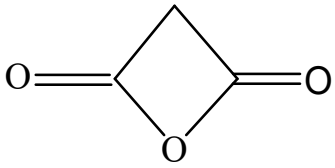
3) 

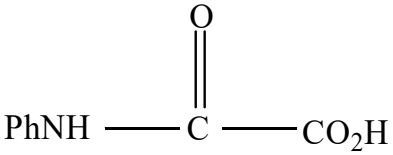
4) 

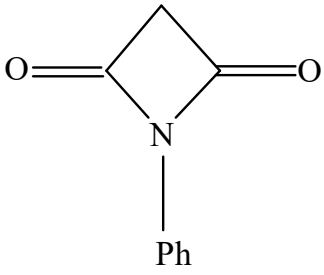
56. 

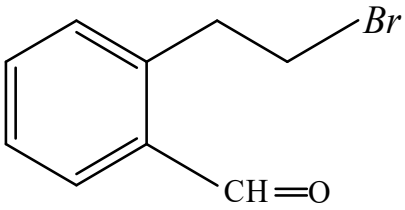
; product (B) is

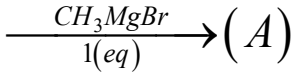
1) 

2) 

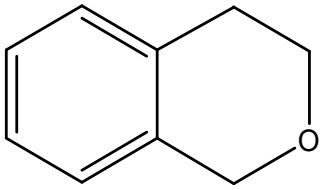
3) 

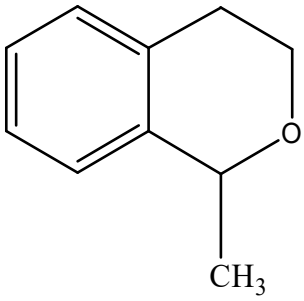
4) 

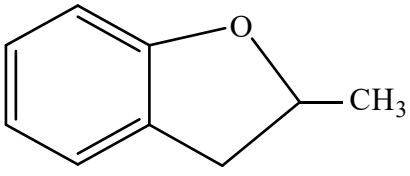
57. 

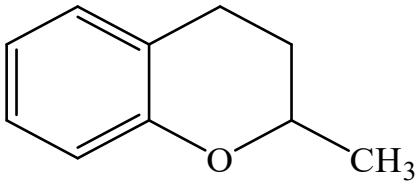


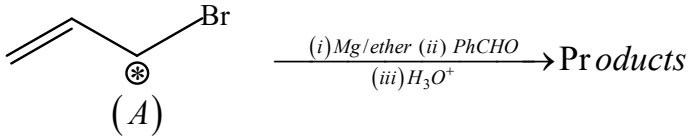
, Find out A

1) 

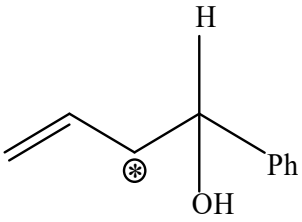
2) 

3) 

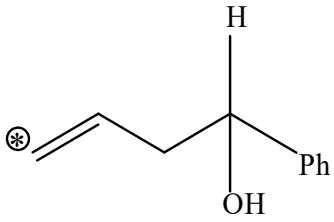
4) 



58. , Find out Products



1)

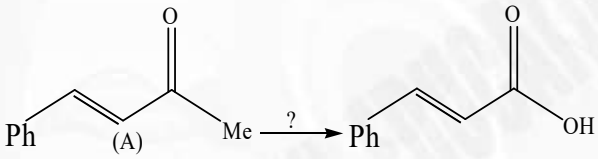
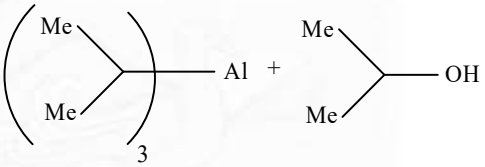
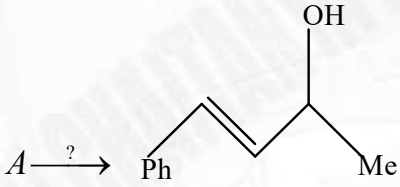
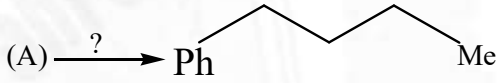
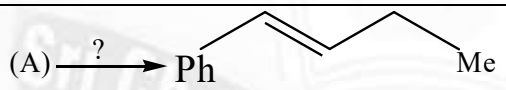


2)

3) Both (1) and (2)

4) None

59. Match the **COLUMN-I** with respect to **COLUMN-II**

	COLUMN -I		**COLUMN-II**
I)		**P)**	
II)		**Q)**	$NH_2NH_2 + \overset{\ominus}{O}H$
III)		**R)**	$Cl\overset{\ominus}{O} + H_3O^{\oplus}$
IV)		**S)**	$Zn - Hg / HCl, (ii) H_2 + Pt$

Choose the correct option from the following:

1) I -P; II -Q; III -R; IV -S

2) I -R; II -P; III -S; IV -Q

3) I -P; II -S; III -Q; IV -R

4) I -R; II -S; III -P; IV -Q

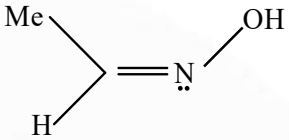
60. $Aldehyde(A) \xrightarrow{NH_2OH.HCl} (B) \xrightarrow{H^{\oplus}} (C) \xrightarrow{H_3O^+,\Delta} MeNH_2 + HCOOH$; Aldehyde(A) and compound (B), respectively are:

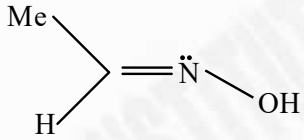
Aldehyde (A)

I. MeCHO

II. HCHO

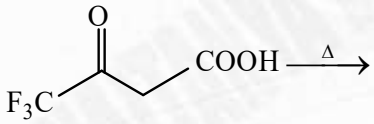
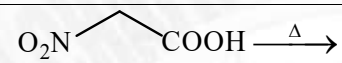
Compound (B)

III. 

IV. 

1) (I), (IV) **2)** (I), (III) **3)** (II), (III) **4)** (II), (IV)

61. Match the **COLUMN-I** with respect to **COLUMN-II**

	COLUMN -I		COLUMN-II
I)	$Br_3C-COOH \xrightarrow[\Delta]{Dil.NaOH}$	**P)**	$CHBr_3+CO_2$
II)	$Br_3C-COOH \xrightarrow[NaOH,\ \Delta]{Conc.}$	**Q)**	$HCOONa + CO + 2Br^{\ominus}$
III)		**R)**	$:CBr_2$
IV)		**S)**	CO_2
		T)	No reaction

Choose the correct option from the following:

1) I -P; II -Q; III -R; IV -T **2)** I -P; II -S; III -R; IV -Q

3) I -P; II -QR; III -T; IV -S **4)** I -T; II -P; III -Q; IV -R

62. **STATEMENT I:** $CH_3COOH \xrightarrow{LiAlH_4} A \xrightarrow{PCl_5} B \xrightarrow{Alc.KOH} C$, the product C is Ethylene.

STATEMENT II: Formation of C from B follows elimination reaction.

1) Both **STATEMENT I** and **STATEMENT II** are Correct.

2) **STATEMENT I** is Correct but **STATEMENT II** is Incorrect

3) **STATEMENT I** is Incorrect but **STATEMENT II** is Correct

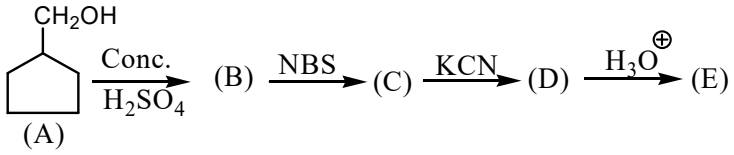
4) Both **STATEMENT I** and **STATEMENT II** are Incorrect.

63. In the presence of a small amount of phosphorous, aliphatic carboxylic acids react with chlorine or bromine to yield a compound in which α- hydrogen has been replaced by halogen. This reaction is known as :

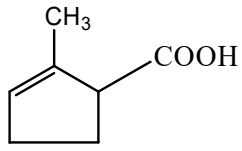
1) Wolff-Kishner reaction **2)** Etard reaction

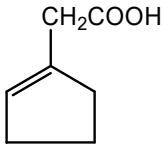
3) Hell-Volhard-Zelinsky reaction **4)** Rosenmund reaction

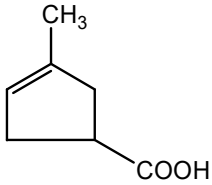
64.

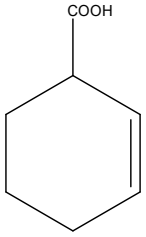


, the compound (E- major) is

1) 

2) 

3) 

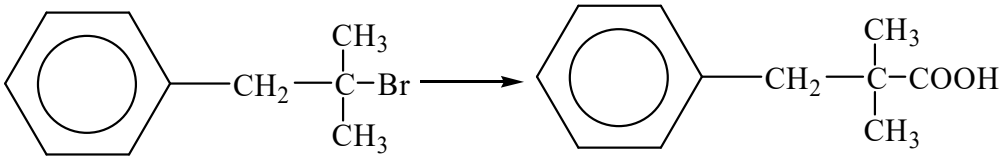
4) 

65. Following two methods are used for the preparation of acid:

$$I \rightarrow R-Br \xrightarrow{NaCN} R-CN \xrightarrow{H_3O^{\oplus}} R-COOH$$

$$II \rightarrow R-Br \xrightarrow[ether]{Mg} RMgBr \xrightarrow[2.H_3O^{\oplus}]{1.CO_2} R-COOH$$

Out of these two methods which will be suitable for following conversion?



1) Both I and II **2)** Only I **3)** Only II **4)** None of these

66. Identify 'C' in the reaction gives below:

$$CH_3CHO \xrightarrow[dil.H_2SO_4]{MnO_4^{\ominus}} A \xrightarrow{SOCl_2} B \xrightarrow{CH_3COONa} C$$

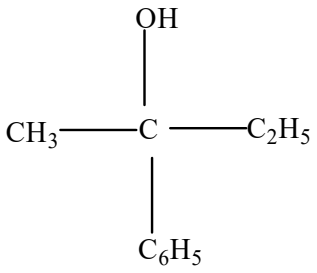
1) $(CH_2ClCO)_2O$ **2)** $(CH_3CO)_2O$

3) $(CH_3)_2CHCH_2COOH$ **4)** CH_3CHO

67. $CH_3COOH + PCl_5 \rightarrow A \xrightarrow[Anhy.AlCl_3]{C_6H_6} B \xrightarrow[(ii)H^{\oplus}]{(i)C_2H_5MgBr/ether} C$, Product (C) is:

1) $CH_3COC_6H_5$ **2)** $CH_3CH(OH)C_6H_5$

3) $CH_3CH(OH)C_2H_5$ **4)**



68. **STATEMENT I:** $PhCN \xrightarrow[H_3O^{\oplus}]{CH_3MgBr} (B) \xrightarrow[I_2]{Ca(OH)_2} (C) \xrightarrow{\Delta} (D)$, the product D is $PhCOOH$.

STATEMENT II: B has 3α-Hydrogens

1) Both **STATEMENT I** and **STATEMENT II** are Correct.

2) **STATEMENT I** is Correct but **STATEMENT II** is Incorrect

3) **STATEMENT I** is Incorrect but **STATEMENT II** is Correct

4) Both **STATEMENT I** and **STATEMENT II** are Incorrect.

69. **ASSERTION (A):** Formic acid is more acidic than 2, 4, 6-trinitrophenol

REASON (R): NO_2 group at Ortho & Para positions in Phenols acts as Strong - M.E groups

1) Both **A** and **R** are Correct and **R** is the Correct explanation of **A**

2) Both **A** and **R** are Correct and **R** is the not the Correct explanation of **A**

3) **A** is incorrect but **R** is Correct

4) **A** is Correct but **R** is not Correct

70. **ASSERTION (A):** On oxidative ozonolysis of Alkynes gives CO_2 as one of the products

REASON (R): $H_3C - C \equiv CH \xrightarrow{O_3 - H_2O} CO_2 + CH_3COOH$

1) Both **A** and **R** are Correct and **R** is the Correct explanation of **A**

2) Both **A** and **R** are Correct and **R** is the not the Correct explanation of **A**

3) **A** is incorrect but **R** is Correct

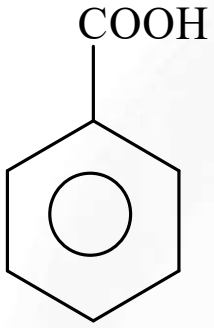
4) **A** is Correct but **R** is not Correct

SECTION-II
(NUMERICAL VALUE TYPE)

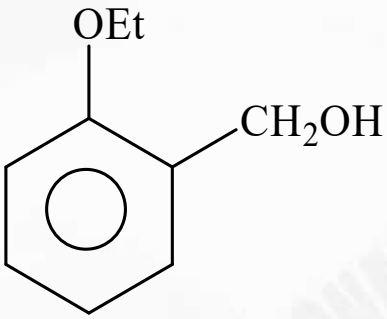
This section contains **5 Numerical Value Type Questions.** The Answer should be within **0 to 9999.** If the Answer is in **Decimal** then round off to the **Nearest Integer** value (Example i,e. If answer is above **10** and less than **10.5** round off is **10** and If answer is from **10.5** and less than **11** round off is **11).**

Marking scheme: +4 for correct answer, 0 if not attempt and -1 in all other cases.

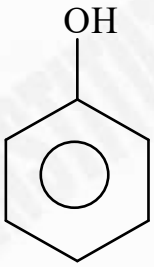
71. Among the following, the total number of compounds soluble in aqueous NaOH is:



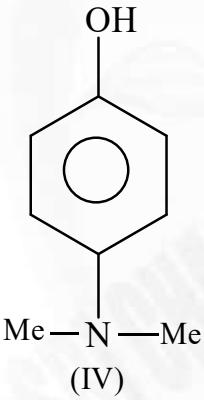
(I)



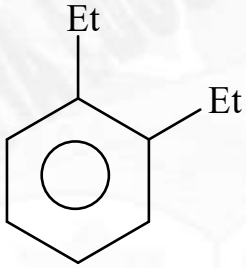
(II)



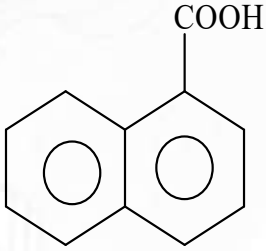
(III)



(IV)

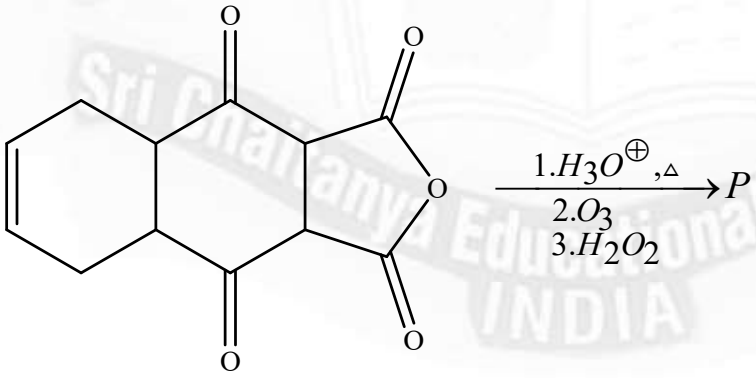


(V)



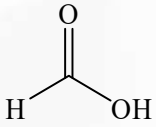
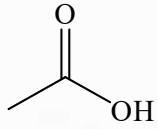
(VI)

72. The total number of carboxylic acid groups in the product P is



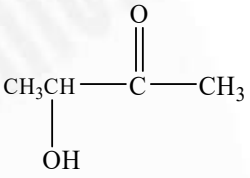
73. How many compound(s) give positive Tollen's test?

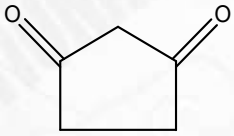
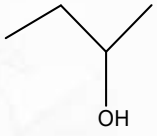
I) D-Glucose **II)** D-Fructose **III)**  **IV)** $PhCH_2OH$

V) CH_3CH_3 **VI)**  **VII)** 

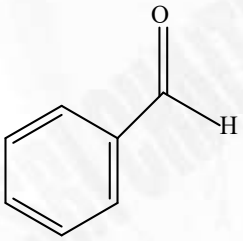
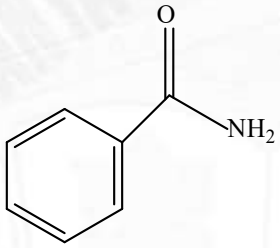
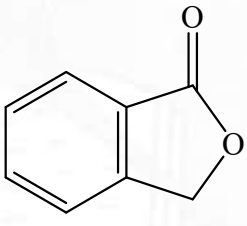
74. Identify the number of compounds which show positive iodoform test.

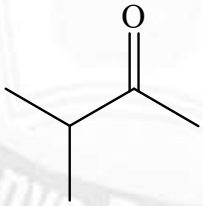
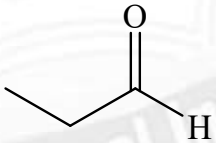
I) $PhCOCH_3$ **II)** $(C_2H_5)_2C=O$ **III)** $CH_3COC_2H_5$ **IV)** CH_3COCH_3

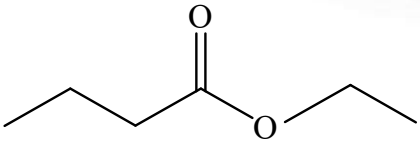
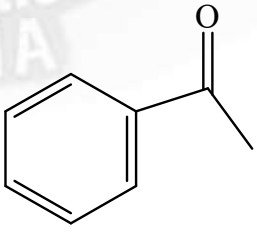
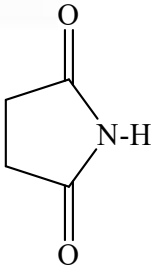
V) $PhCOC_2H_5$ **VI)** CH_3CHO **VII)** CH_3CH_2Br **VIII)** 

IX) $CH_3COCOCH_3$ **X)** $Ph_3C-COCH_3$ **XI)**  **XII)** 

75. Examine the structural formula given below and identify the number of compounds which are reduced by $NaBH_4$.

I)  **II)**  **III)** 

IV)  **V)**  **VI)** 

VII)  **VIII)**  **IX)** 

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81 RANK P PRANAYA SAI MUKESH Appl. No. 250310608114	89 RANK ADITYA SINGH Appl. No. 250310151728	91 RANK JAY AGARWAL Appl. No. 250310122371*	94 RANK V ESWAR KARTHIK Appl. No. 250310236425	96 RANK SAKSHAM GARG Appl. No. 250310026726*	97 RANK RANVEER SINGH VIRDE Appl. No. 250310790734		

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