Sri Chaitanya IIT Academy.,India.

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A right Choice for the Real Aspirant

ICON Central Office - Madhapur - Hyderabad

Sec: Sr.Super60	**2020_P2**	**Date: 18-09-22**
Time: 02.30Pm to 05.30Pm	**RPTA-02**	**Max. Marks: 198**

18-09-2022_Sr.Super60_Jee-Adv(2020-P2)_RPTA-02_Syllabus

PHYSICS   : RPTA-01 & RPTA-02 Syllabus

CHEMISTRY   : RPTA-01 & RPTA-02 Syllabus

MATHEMATICS : RPTA-01 & RPTA-02 Syllabus

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

JEE-ADVANCE-2020-P2-Model

Time: 3:00Hour's   **IMPORTANT INSTRUCTIONS**   **Max Marks: 198**

PHYSICS:

Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 1 – 6)	Questions With Integer Answer Type	3	-1	6	18
Sec – II(Q.N : 7 – 12)	**Questions with Multiple Correct Choice +1 partial marks**	4	-2	6	24
Sec – III(Q.N : 13 – 18)	Questions with Numerical Value Answer Type	4	0	6	24
Total				**18**	**66**

CHEMISTRY:

Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 19 – 24)	Questions With Integer Answer Type	3	-1	6	18
Sec – II(Q.N : 25 – 30)	**Questions with Multiple Correct Choice +1 partial marks**	4	-2	6	24
Sec – III(Q.N : 31 – 36)	Questions with Numerical Value Answer Type	4	0	6	24
Total				**18**	**66**

MATHEMATICS:

Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 37 – 42)	Questions With Integer Answer Type	3	-1	6	18
Sec – II(Q.N : 43 – 48)	**Questions with Multiple Correct Choice +1 partial marks**	4	-2	6	24
Sec – III(Q.N : 49 – 54)	Questions with Numerical Value Answer Type	4	0	6	24
Total				**18**	**66**

**PHYSICS**   **Max Marks: 62**
SECTION-I
(INTEGER ANSWER TYPE)
• This section contains SIX (06) 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.   A certain quantity of ideal gas takes up 56J of heat in the progress AB and 360J in the process AC. What is the number of degrees of freedom of the gas?
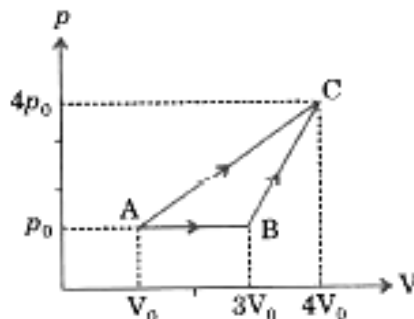

2.   The energy radiated by a black body at 2000K is found to have the maximum value at a wavelength $1.5\,\mu m$. Its emissive power being $8000W/m^{-2}$. When the body is cooled to a temperature T, the emissive power decreases to $500W/m^{-2}$. At this temperature T, the maximum of energy distribution occurs at a wavelength……. μm

3.   One mole of a monatomic gas is involved in the cyclic process as shown in the PV graph. Extension of the line segments 1-2 and 3-4 pass through the origin, and the curves 1-4 and 2-3 are isotherms. Find the ratio $\dfrac{V_3}{V_2}$ if $\dfrac{V_2}{V_1}=2$
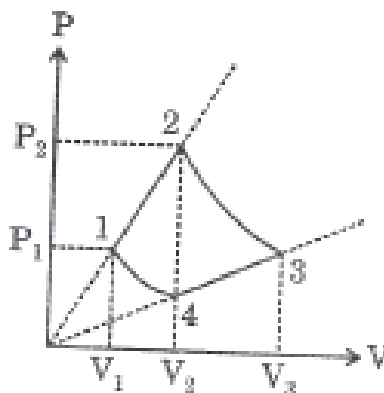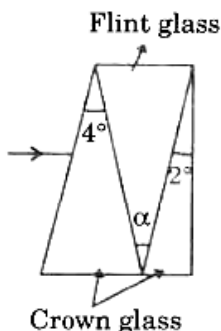
4. In the figure, L is half part of an equiconvex glass lens ($\mu = 1.5$) whose surfaces have radius of curvature $R = 40cm$ and its right surface is silvered. Normal to its principal axis a plane mirror M is placed on right of the lens . Distance between lens L and mirror M, is b. A small object O is placed on left the lens such that there is no parallax between final images formed by the lens and mirror. If transverse length of final image formed by lens is twice that of image formed by the mirror, calculate distance `a' in cm between lens and object.
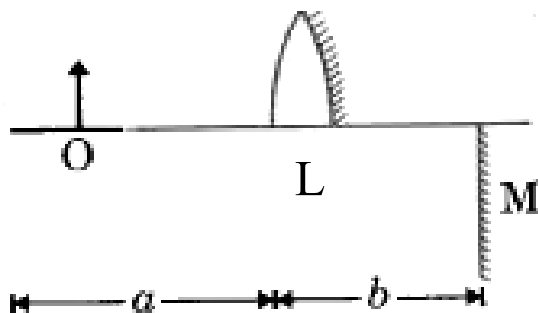
5. A Diverging lens is placed perpendicular to a plane mirror. A point source is placed beyond the focus on the optic axis. The number of images formed is _____
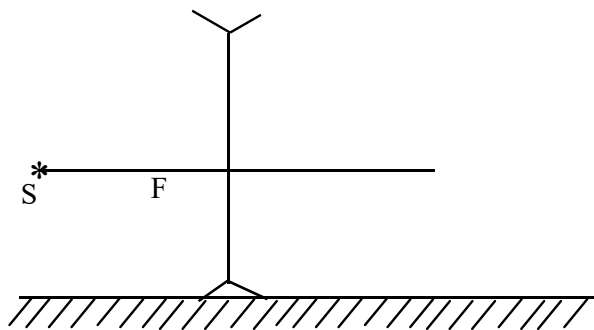
6. The refractive indices of the crown glass for violet and red lights are 1.51 and 1.49 respectively and those of the flint glass are 1.77 and 1.73 respectively. A narrow beam of white light is incident at small angle of incident on the shown combination of thin prisms. Find the value of α for which the mean deviation of the incident beam is zero.

Flint glass
Crown glass

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.

7. A sample of ideal gas some mass is taken through the cyclic process shown in the figure. The temperature of the gas at state A is $T_A = 200K$, and at state C is $T_C = 1800K$ Choose the correct option:
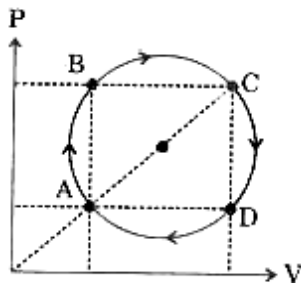

A) $\dfrac{V_A}{V_C} = \dfrac{1}{3}$ **B)** $\dfrac{V_A}{V_B} = \dfrac{1}{9}$ **C)** $\dfrac{P_A V_B}{P_C V_C} = \dfrac{1}{3}$ **D)** $\dfrac{P_A V_A}{P_C V_C} = \dfrac{1}{9}$

8. An enclosure's wall are somehow maintained at constant temperature T_0 K. A body (area A temperature $TK < T_0 K$, absorptivity is a and emissivity is e) is placed inside the enclosure (σ = Stephen constant). Choose the correct option(s).

A) Power absorbed by body is $aA\sigma T_0^4$

B) The body will be absorbing energy even after its temperature has reached T_0

C) At some temperature will be only emitting energy with no absorption

D) At all the time rate of absorption is equal to rate of emissions as a=e

9. A sample A of liquid water and a sample B of ice of identical mass are kept in two neighboring chambers in an otherwise insulated container. The chambers can exchange heat with each other. The graph of temperature of the two chambers is plotted with time $S_{ice} = \dfrac{S_{water}}{2}$
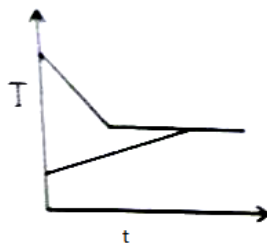
A) Finally the contents in sample A is water

B) Equilibrium temperature is freezing point of water.

C) Ice melts partly

D) Finally the Scontents in sample B are ice only.

10. Two converging lenses of same aperture size are placed with their principal axis is coinciding. Their focal lengths are in the ratio K. When a light beam is incident parallel to their common principal axis, it is observed that final emergent beam is also parallel to their common principal axis. It is observed that when beam is incident from left intensity recorded on screen I_1, but when positions of lens are interchanged, same point on screen records an intensity I_2, Then $\dfrac{I_1}{I_2}$ may be equal to:
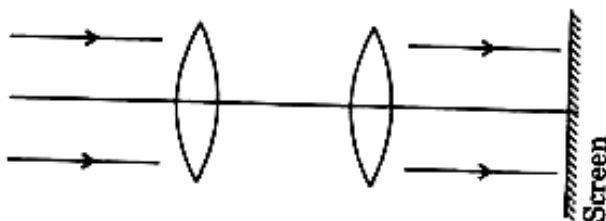

A) K^2 **B)** K^{-4} **C)** $\dfrac{1}{K}$ **D)** $\dfrac{1}{K^2}$

11. There is a spherical glass of ball of refractive index μ_1 and another glass ball of refractive index μ_2 inside as shown in figure. The radius of the oter ball is R_1 and that of inner ball is R_2. A ray is incident on the outer surface of the ball at an angle i_1. Mark the correct options.
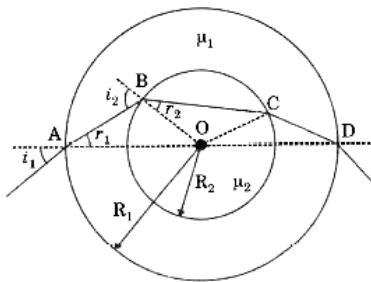
A) The value of r_1 is $\sin^{-1}\left(\dfrac{\sin i_1}{\mu_1}\right)$ **B)** The value of r_2 is $\sin^{-1}\left(\dfrac{R_1}{\mu_2 R_2}\sin i_1\right)$

C) The value of r_1 is $\sin^{-1}\left(\dfrac{\sin i_2}{\mu_2}\right)$ **D)** The value of r_2 is $\sin^{-1}\left(\dfrac{R_1}{\mu_2 R_1}\sin i_1\right)$

12.   The refractive index of the medium with a certain region, $x>0, y>0$, changes with y, A thin light ray travelling in the x-direction in medium having refractive index $\mu_0 = 1$ strikes another medium of refractive index μ at right angles and moves through the medium along a circular arc of radius R as shown in the figure. The material with the greatest known refractive index is diamond , but even the refractive index of the material does not reach the value $\mu_{max} = 2.5$ .It is this limit that sets the maximum angular size of the arc the light ray can cover. Angular size of arc is the angle subtended by the arc at the centre.
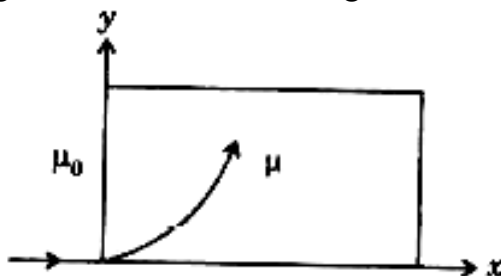

A) The variation of refractive index μ with y is given as $\mu = \dfrac{R}{R-y}$

B) The unit vector in the direction of refracted light at $y = \dfrac{R}{2}$ is $\dfrac{1}{2}\hat{i} + \dfrac{\sqrt{3}}{2}\hat{j}$

C) If the maximum angular size of the arc of light is $\theta_{max} = \dfrac{2}{5}$

D) If the maximum angular size of the arc of light is θ_{max} then $\cos\theta_{max} = \dfrac{2}{5}$

SECTION – III
(NUMERICAL VALUE TYPE)

• This section contains **SIX (06)** 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 be evaluated according to the following marking scheme:
Full Marks: +4 If ONLY the correct numerical value is entered;
**Zero Marks**: 0 **In** all other cases..

13. A heat engine operates between two identical bodies of different temperature $T_A = 80K$ and

$T_B = 20K$, with each body having mass m and constant specific heat capacity C. The bodies

remain at constant pressure and undergo no change of phase. The final temperature attained by

the two bodies A and B of the heat engine is_____ K if the engine extracts the maximum amount

of mechanical work

14. At the centre of a cylinderical shaped transparent glass there in an opaque metal cylinder.

There is some transparent liquid in the glass around the cylinder. Observing the cylinder

from a distant point , due to the refraction of light, the part of the cylinder in the liquid

seems wider. The radius of the glass tube is 4cm, the radius of the metal cylinder is 2.5cm

at the represents the index of the liquid is 1.5. The apparent increase in the diameter

(in cm) of the cylinder is
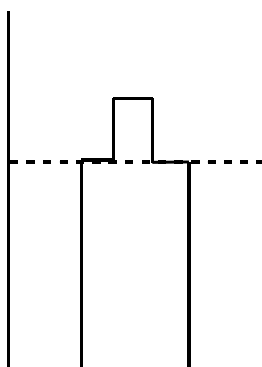
15. The figure shows an object OA and its image O`A` formed by a thin lens. Find the focal

length of the lens in cm if the distance from the object to it's image along the optic axis

OO` is L=10cm and $\dfrac{OA}{O'A'} = K = 3$
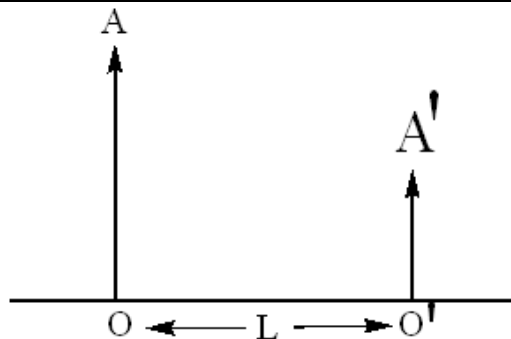
16. The distance between between an object and a divergent lens is m times greater than focal length of lens. If the image is m + n times smaller than object

$\left(\dfrac{Height \; of \; image}{Height \; of \; object} = \dfrac{1}{m+n} \right)$ then find n

17. A thin bi-convex lens of refractive index $\dfrac{3}{2}$ and radius of curvature 50cm is placed on a reflecting convex surface of radius of curvature is 100cm. A point object is placed on the principal axis of the system such that its final image coincides with itself. Now few drops of a transparent liquid is placed between the mirror and lens such that final image of the object is at infinity. The refractive index of the liquid used is given by μ .

18. The concave spherical mirror of radius R=9cm, forms the image of a source which coincides with it. When a little liquid is poured in the mirror, a second image is formed between the source and the mirror at a distance l=4cm from the source. Find the refractive index of the liquid.
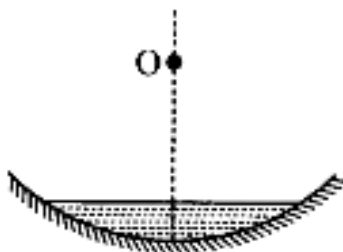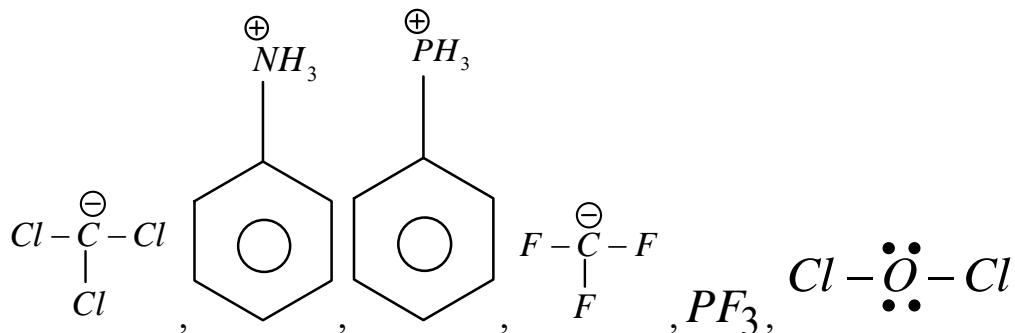
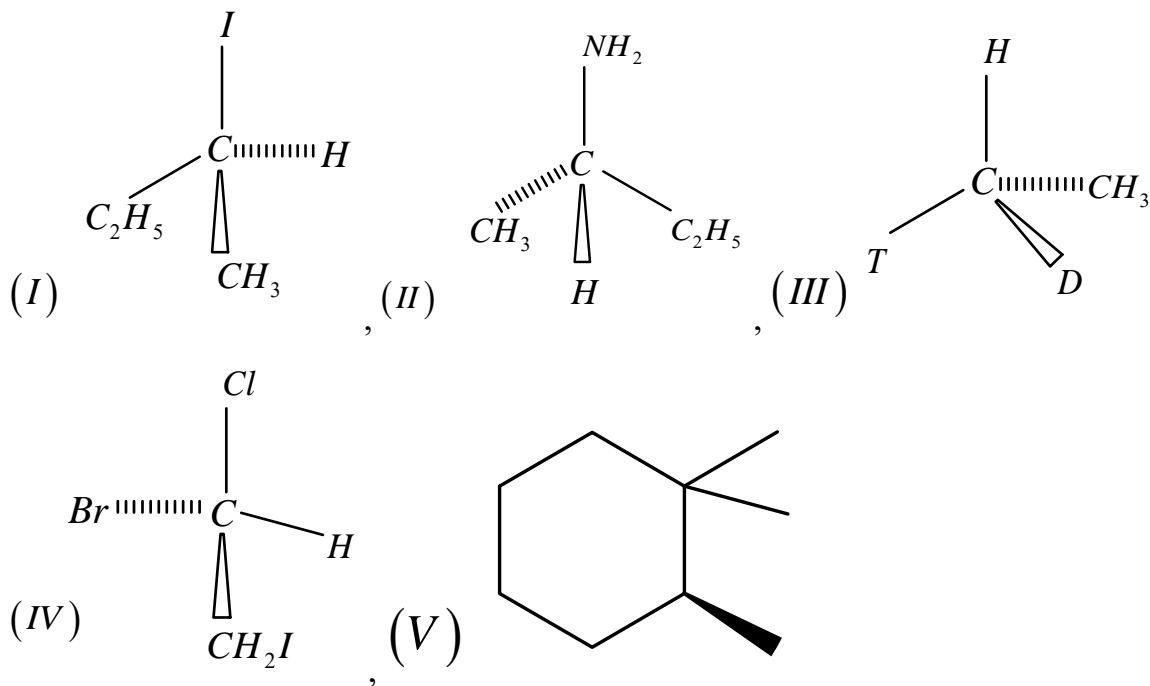**CHEMISTRY**   **Max Marks: 62**
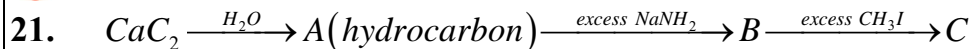
SECTION-I
(INTEGER ANSWER TYPE)

• This section contains SIX (06) 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.
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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

19.   How many from the following exhibit d – orbital resonance

$$\overset{\oplus}{NH_3} \qquad \overset{\oplus}{PH_3}$$

$$Cl-\overset{\ominus}{\underset{Cl}{C}}-Cl \quad , \qquad , \qquad , \quad F-\overset{\ominus}{\underset{F}{C}}-F \quad , PF_3, \quad Cl-\overset{\cdot\cdot}{\underset{\cdot\cdot}{O}}-Cl$$

20.   How many of the following are with R – Configuration

(I) C with I (up), C_2H_5, H (wedge), CH_3 (down)

(II) C with NH_2 (up), CH_3, C_2H_5, H (down)

(III) C with H (up), T, CH_3, D

(IV) C with Cl (up), Br, H, CH_2I (down)

(V) cyclohexane with gem-dimethyl and methyl

21. $CaC_2 \xrightarrow{H_2O} A(hydrocarbon) \xrightarrow{excess\ NaNH_2} B \xrightarrow{excess\ CH_3I} C$
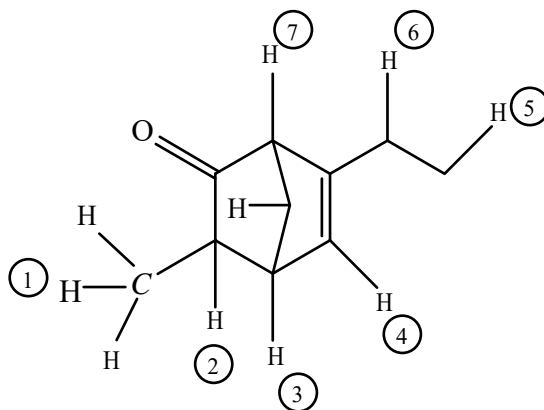
If the mass of O_2 required for complete combustion of 1 mole of C is x grams then find $\dfrac{x}{22} =$

22.   How many of the reagents attack to the alkene "syn" Addition

$\underset{I}{Br_2 / H_2O}, \quad \underset{II}{H_2 / Pd}, \quad \underset{III}{dilKMnO_4 / OH^- cold},$

$\underset{IV}{OsO_4 / NaHSO_3}, \quad \underset{V}{BH_3 / H_2O_2 / OH^-}, \quad \underset{VI}{mCPBA / H_2O}, \quad \underset{VII}{ICl / H_2O}$
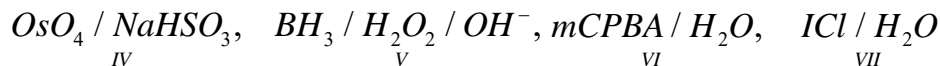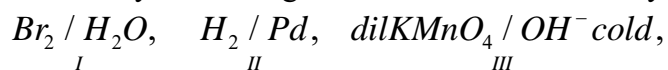
23.   The enol form of the compound is formed by ionization of which position?

24.   Find the number of optical active alkynes having the Molecular formula $C_3FClBrI$.

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;
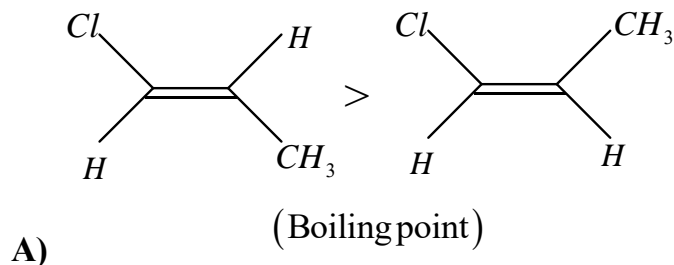**Partial Marks**: +2 If three or more options are correct but ONLY two options are chosen, both of which are correct;
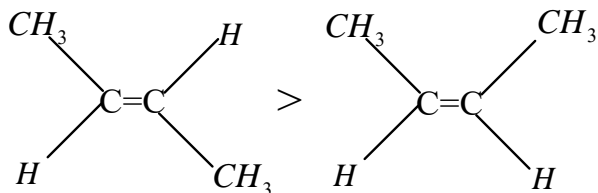**Partial Marks**: +1 If two or more options are correct but ONLY one option is chosen and it is a correct option;
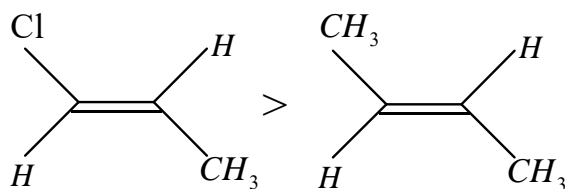**Zero Marks**: 0 If none of the options is chosen (i.e. the question is unanswered);
Negative Marks: -2 In all other cases.

25.   Choose the Correct

(Boiling point)

A)

B)

(melting point)

(Reactivity toward HBr)

C)

(Boiling point)

D)
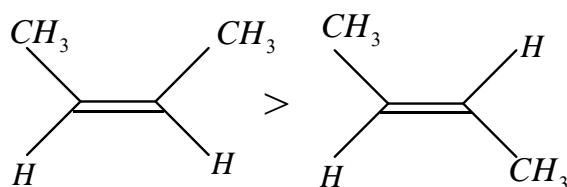
26. Which among the following is not true?

A) Moist ethylene can be dried by passing it through concentrated H_2SO_4 & $HgSO_4$

B) Decolorization of Baeyer's reagent is only test for identifying alkenes

C) Propene with diborane forms an additive product, which on reaction with H_2O_2 / OH^- forms 1-propanol

D) Lewisite is formed by the reaction of acetylene and arsenic chloride.

27. Which of the following are correct statement regarding these molecules.

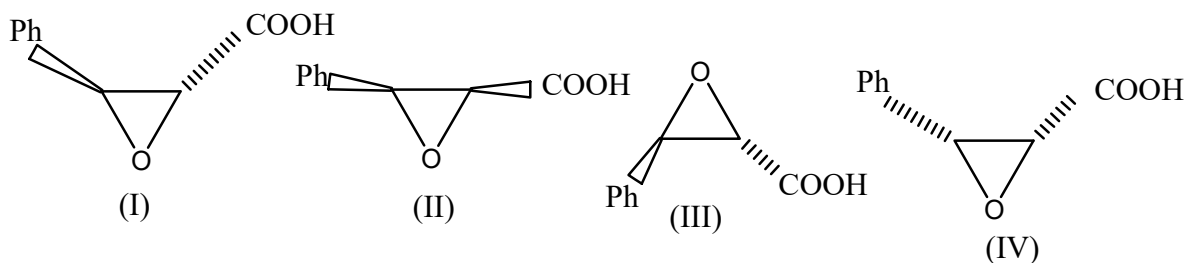(I)   (II)   (III)   (IV)

A) I, II are diastereomers   **B)** II, IV are enantiomers

C) I, III are enantiomers   **D)** III, IV are homomers

28. In which case first compound is more acidic than second

A)

B)

C)

D)
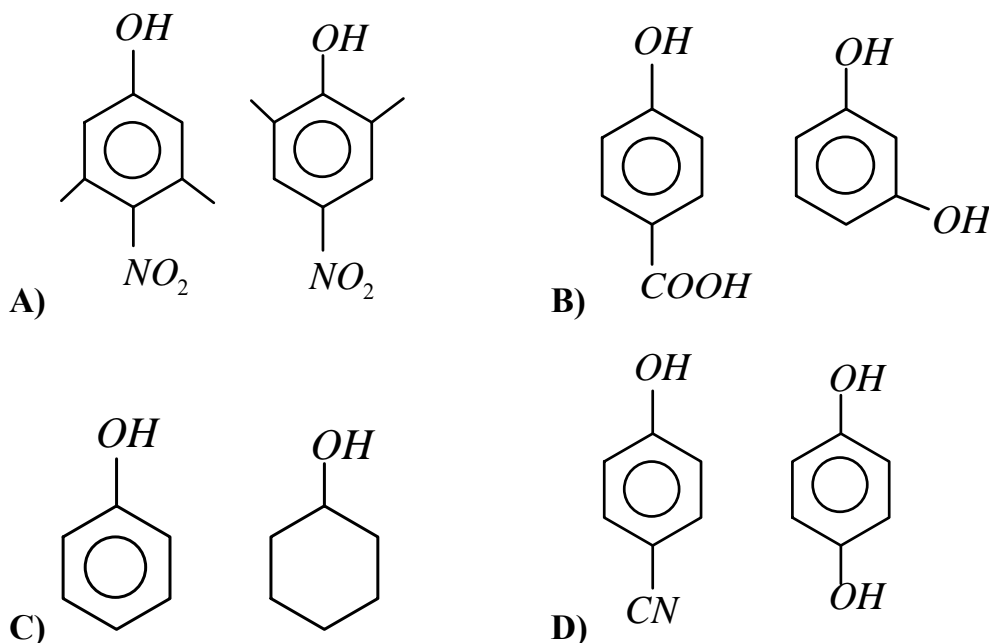
29. Which of the following is/are correct statement about Oxymercuration Demercuration.

A) In the first two steps Oxymercuration occur i.e H_2O & $Hg(OAC)_2$ add to double bond

B) In the Demercuration step, $NaBH_4$ reduces 'C' connected to HgOAC group with hydrogen.

C) The net reaction is addition of H_2O according to Markownikoff rule.

D) Rearrangement takes place

30. Correct statements in the following

A) During any photochemical reaction if any Chirality is created in the product, then both R & S enantiomer's are obtained

B) During any photochemical reaction if the parent compound already has a chirality center, then new chirality in the product form diastereomers

C) Number of products in Photochemical monohalogenation tells about presence of chemically different "H" present in alkane

D) Chlorination & Bromination are the general halogenation reaction of alkanes

SECTION – III
(NUMERICAL VALUE TYPE)

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• Answer to each question will be evaluated according to the following marking scheme:
Full Marks: +4 If ONLY the correct numerical value is entered;
Zero Marks: 0 **In** all other cases..

31. The specific rotation of S – Carvone is $+61°$, the optical rotation of sample of mixture of R & S Carvone is $(-23°)$. Find the percentage of R – Carvone in the sample.
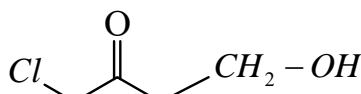
32.

Find the number of stereoisomers

33. Aqueous solution of 20gm of sodium acetate is Undergoing Kolbe electrolysis to produce an alkane, during which gas released of Cathode can reduce how much mass of Acetylene completely? (in grams)

34. A hydrocarbon gives 72 grams of H_2O and 308 grams of CO_2 on complete combustion. Then what will be its Empirical formula weight?

35. What is the molecular weight of Red precipitate when Acetylene reacts with excess Cu_2Cl_2 / NH_4OH ? [Cu = 63.55]

36. What is the molecular weight of alkene with minimum number of carbons which can show optical isomerism?(Don't consider isotopes)

MATHEMATICS   **Max Marks: 62**

SECTION-I
(INTEGER ANSWER TYPE)

• This section contains SIX (06) questions.
• The answer to each question is a SINGLE DIGIT INTEGER ranging from 0 TO 9, BOTH INCLUSIVE.
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Zero Marks: 0 If the question is unanswered;
Negative Marks: -1 In all other cases

37. Let P be a matrix of order 3×3 such that all the entries in P are from the $set\{-1,0,1\}$. Then, the maximum possible value of the determinant of P is _____.

38. Let β be a real number. Consider the matrix $A = \begin{pmatrix} \beta & 0 & 1 \\ 2 & 1 & -2 \\ 3 & 1 & -2 \end{pmatrix}$. If $A^7 - (\beta-1)A^6 - \beta A^5$ is a singular matrix, then the value of 9β is _____.

39. The equation $x^4 + ax^3 + bx^2 + ax + 1 = 0$ has atleast one real root and if the minimum value of $E(a,b) = a^2 + b^2$ can be expressed as $\dfrac{p}{q}$ (p and q are relatively prime), then $(p+q)$ is

40. For each natural number $n \geq 2$, the largest possible value of the expression

$V_n = \sin x_1 \cos x_2 + \sin x_2 \cos x_3 + ... + \sin x_n \cos x_1 \ is \ f(n)$, then $\dfrac{f(100)}{10}$ is equal to (where $x_1, x_2, x_3 .... x_n$ are arbitrary real numbers)

41. If the sum of the series 9+16+29+54+103…upto 10 terms is x, then the remainder of $x/9$ is

42. If $f(x) = e^x - \dfrac{1}{(x-1)} - \dfrac{1}{(x-2)} - \dfrac{1}{(x-3)}$ the number of times the $f(x)$ intersects x-axis

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).
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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.

43. Let

$u : ax^2 + bx + c = 0$

$v : dx^2 + ex + f = 0$ are quadratic equations in term of x, Consider Q.E in y is

$w : gx^2 + hx + i = 0$

$E : uy^2 + vy + w = 0$ Which of the following is correct?

A) If for some value of x say $x = x_1$, the eq $E = 0$ has one root is infinite and other root is

a non-zero finite quantity then $u = 0 \ and \ v = 0$ will have a common root.

B) If for some value of x say $x = x_2$, the eq $E = 0$ has both roots infinite then

$u = 0 \ and \ v = 0$ will have a common root

C) If for some value of x say $x = x_3$, the eq $E = 0$ become an identity for y then

$u = 0$, $v = 0$ and $w = 0$ must have a common root

D) If for some value of x say $x = x_4$, the eq $E = 0$ both root real & distinct then

$v = 0 \ and \ w = 0$ must have a common root

44. If three AM, A_1, A_2, A_3 and three HM, H_1, H_2, H_3 are inserted between 3 and 6 and
$A_1 H_3 - A_2 H_2$ is equal to r

A) the value of r is equal to 2

B) $\displaystyle\sum_{n=r+1}^{100} \frac{1}{(2n+1)^2 - 1} = \frac{25}{101}$

C) $\displaystyle\sum_{n=r+1}^{\infty} 2^{\frac{n}{n+1}} = 1$

D) None of these

45. Let α, β are the roots of equation $x^2 - a_1 x + 1 = 0$ and consider the sequence of numbers

$a_r, r \geq 0$ $a_0 = 1$ and $a_{r+1}^2 = 1 + a_r . a_{r+2}$. Then which of the following is true?

A) $a_r + a_{r+2} = a_1 . a_{r+1}$

B) $a_r + a_{r+2} = 2a_{r+1}$

C) $a_n = \dfrac{\alpha^{n+1} - \beta^{n+1}}{\alpha - \beta}$

D) $a_n = \dfrac{\alpha^{n+1} + \beta^{n+1}}{\alpha + \beta}$

46. Let $P = \begin{bmatrix} 3 & -1 & -2 \\ 2 & 0 & \alpha \\ 3 & -5 & 0 \end{bmatrix}$, where $\alpha \in R$, Suppose $Q = \begin{bmatrix} q_{ij} \end{bmatrix}$ is a matrix such that $PQ = KI$, where

$k \in R, k \neq 0$ and I is the identity matrix of order 3. If $q_{23} = -\dfrac{k}{8}$ and $\det(Q) = \dfrac{k^2}{2}$, then

A) $\alpha = 0, k = 8$

B) $4\alpha - k + 8 = 0$

C) $\det(P \, adj(Q)) = 2^9$

D) $\det(Q \, adj(P)) = 2^{13}$

47. If A and B are orthogonal matrices of order 2 such that ABA^{-1} is a symmetric matrix, where A,B and $ABA^{-1} \neq I, -I$

(Note : $|X|, tr(X) \, and \, adj(X)$ denote determinant value, trace and adjoint of matrix X respectively). Then

A) $tr\left(\left(ABA^{-1} \right)^{2017} \right)$ is equal to 2

B) $tr\left(\left(ABA^{-1} \right)^{2017} \right)$ is equal to 1

C) Sum of elements of $\left(adj \dfrac{B}{\sqrt{2}} \right)^2$ is equal to 2

D) Sum of elements of $\left(adj \dfrac{B}{\sqrt{2}} \right)^2$ is equal to 1

48. Consider the eq, $x^5 + 5\lambda x^4 - x^3 + (\lambda\alpha - 4)x^2 - (8\lambda + 3)x + \lambda\alpha - 2 = 0$ the value of α for which the eq. has two roots independent of λ

A) -1   **B)** -2   **C)** -3   **D)** 10

SECTION – III
(NUMERICAL VALUE TYPE)

• This section contains **SIX (06)** 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 be evaluated according to the following marking scheme:
Full Marks: +4 If ONLY the correct numerical value is entered;
Zero Marks: 0 **In** all other cases..

49. Let $P = \begin{bmatrix} 1 & 0 & 0 \\ 4 & 1 & 0 \\ 16 & 4 & 1 \end{bmatrix}$ and I be the identity matrix of order 3. If $Q = \begin{bmatrix} q_{ij} \end{bmatrix}$ is a matrix such that

$P^{50} - Q = I$, then $\dfrac{q_{31} + q_{32}}{q_{21}}$ equals

50. Let $S = \sin^4 12^0 + \left(\dfrac{\sin^2 24^0}{2} \right)^2 + \left(\dfrac{\sin^2 48^0}{4} \right)^2 + \left(\dfrac{\sin^2 96^0}{8} \right)^2 + \dots$ upto 8 terms. If

$P = \left(2^9 \cosec 12^0 \right)^2 \times S$, then $P/100$.

51. The value of expression $\dfrac{3}{1! + 2! + 3!} + \dfrac{4}{2! + 3! + 4!} + \dots + \dfrac{2021}{2019! + 2020! + 2021!} = \dfrac{1}{k_1!} - \dfrac{1}{k_2!}$,

then $(k_2 - k_1)$ is

52. If $h(x)$ and $g(x)$ are any two real valid functions such that

$|h(x) + g(x)| \geq |h(x)| + |g(x)|$ and $g(x) \neq 0; h(x) g(x) \leq 0$ then the value of $\displaystyle\sum_{r=1}^{3} h(r) = ?$

53. let A and B be 3x3 matrices and $P = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}, B = PAP$, then, $\displaystyle\lim_{n \to \infty} \dfrac{tr\left(A^n + PB^n P \right)}{tr\left(A^n \right)}$ is

equal to (where $\left| A^n \right| \neq 0$, tr represents trace of square matrix)

54. Consider the equation $x^4 - ax^3 - bx^2 - cx - d = 0, \, where \, a,b,c,d \in I^+, a \geq b \geq c \geq d$ then the number of integral solution is/are