Resonance®
Educating for better tomorrow

JEE (Main)

PAPER-1 (B.E./B. TECH.)

2023

COMPUTER BASED TEST (CBT)

Questions & Solutions

Date: 01 February, 2023 (SHIFT-2) | TIME : (3.00 p.m. to 6.00 p.m)

Duration: 3 Hours | Max. Marks: 300

SUBJECT: CHEMISTRY

Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | **FAX No. :** +91-022-39167222

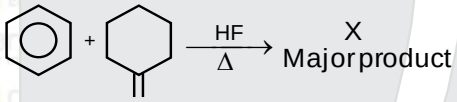
To Know more : sms **RESO** at **56677** | **Website :** www.resonance.ac.in | **E-mail :** contact@resonance.ac.in | **CIN :** U80302RJ2007PLC024029

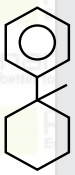
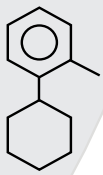
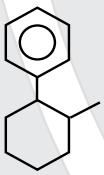
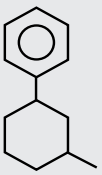
Toll Free : 1800 258 5555 **7340010333** facebook.com/ResonanceEdu twitter.com/ResonanceEdu www.youtube.com/resowatch blog.resonance.ac.in

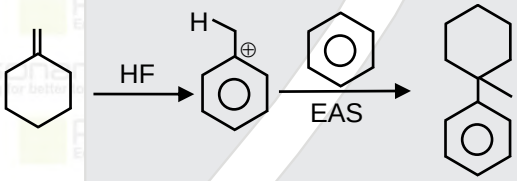
PART : CHEMISTRY

31. Given below are two statement : one is labelled as Assertion (A) and the other is labelled as reason (R).
Assertion (A) : Gypsum is used for making fireproof wall boards.
Reason (R) : Gypsum is unstable at high temperatures.
In the light of the above statements, choose the correct answer from the options given below :
(1) (A) is not correct but (R) is correct
(2) Both (A) and (R) are correct and (R) is the correct explanation of (A)
(3) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
(4) (A) is correct but (R) is not correct

NTA (3)
RESO (3)
Sol. Gypsum is used for fire proof wall bound at high temperature Gypsum dissociates.

32. 'X' is : 

(1) 
(2) 
(3) 
(4) 

NTA (1)
RESO (1)
Sol. 

33. The industrial activity held least responsible for global warming is :
(1) steel manufacturing
(2) manufacturing of cement
(3) Industrial production of urea
(4) Electricity generation in thermal power plants

NTA. (3)
RESO (3)
Sol. In urea industry N_2, CO_2 and H_2 are consumed and no green house gases are emitted.

34. The starting material for convenient preparation of deuterated hydrogen peroxide (D_2O_2) in laboratory is:
(1) 2-ethylanthraquinol (2) BaO_2 (3) BaO (4) $K_2S_2O_8$

NTA (4)
RESO (4)

Sol. Peroxodisulphate, obtained by electrolytic oxidation of acidified sulphate solutions at high current density, on hydrolysis yields hydrogen peroxide.

$$2HSO_4^-(aq) \xrightarrow{\text{Electrolysis}} HO_3SOOSO_3H(aq) \xrightarrow{\text{Hydrolysis}} 2HSO_4^-(aq) + 2H^+(aq) + H_2O_2(aq)$$

This method is now used for the laboratory preparation of D_2O_2.

$$K_2S_2O_8\ (s) + 2D_2O\ (l) \rightarrow 2KDSO_4\ (aq) + D_2O_2\ (l)$$

35. The effect of addition of helium gas to the following reaction in equilibrium state, is :

$PCl_5(g) \rightleftharpoons PCl3(g) + Cl_2(g)$

(1) addition of helium will not affect the equilibrium

(2) the equilibrium will shift in the forward direction and more of Cl_2 and PCl_3 gases will be produced.

(3) the equilibrium will go backward due to suppression of dissociation of PCl_5.

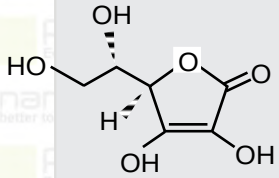
(4) helium will deactivate PCl_5 and reaction will stop.

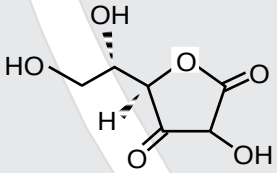
NTA (2)

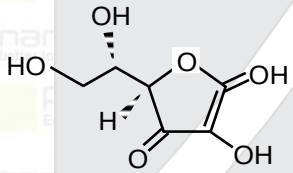
RESO (1 & 2)

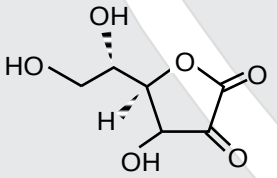
Sol. At constant pressure equilibrium shit where number of moles of gas increases so this reaction goes forward direction.

36. All structures given below are of vitamin C. Most stable of them is :

(1) 

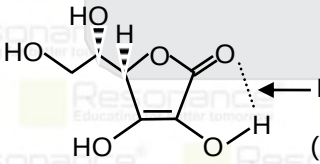
(2) 

(3) 

(4) 

NTA (1)

RESO (1)

Sol. 

(most stable)

37. Which one of the following sets of ions represents a collection of isoelectronic species ?

(Given : Atomic Number : F : 9, Cl : 17, Na = 11, Mg = 12, Al = 13, K = 19, Ca = 20, Sc = 21)

(1) N^{3-}, O^{2-}, F^-, S^{2-} (2) Li^+, Na^+, Mg^{2+}, Ca^{2+}

(3) Ba^{2+}, Sr^{2+}, K^+, Ca^{2+} (4) K^+, Cl^-, Ca^{2+}, Sc^{3+}

NTA (4)

RESO (4)

Sol. Ca^{+2}, K^+, Sc^{+3}, Cl^- contain same no. of electrons.

38. The correct order of bond enthalpy (kJ mol^{-1}) is :

(1) C – C > Si – Si > Ge – Ge > Sn – Sn (2) C – C > Si – Si > Sn – Sn > Ge – Ge

(3) Si – Si > C – C > Ge – Ge > Sn – Sn (4) Si – Si > C – C > Sn – Sn > Ge – Ge

NTA (1)

RESO (1)

Sol. As bond length increases, bond energy decreases.

39. The complex cation which has two isomers is :

(1) $[Co(H_2O)_6]^{3+}$ (2) $[Co(NH_3)_5Cl]^{+}$ (3) $[Co(NH_3)_5NO_2]^{2+}$ (4) $[Co(NH_3)_5Cl]^{2+}$

NTA (3)

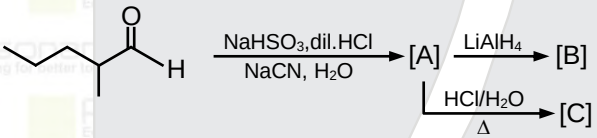
RESO (3)

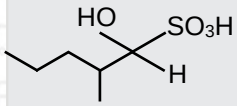
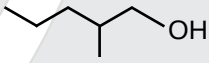
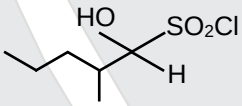
Sol. $[Co(NH_3)_5(NO_2)]^{+2}$ will show structural isomerism as NO_2^- is ambidentate ligand

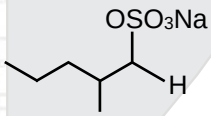
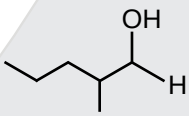
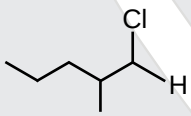
$NO_2^- \rightarrow$ nitrito-N

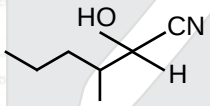
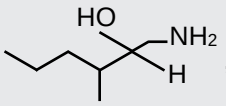
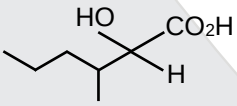
$ONO^- \rightarrow$ nitrito-O

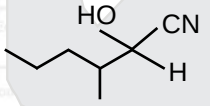
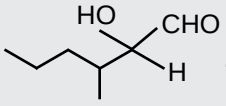
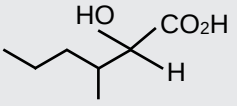
40. The structures of major products A, B and C in the following reaction are sequence.



(1) A =  , B =  , C = 

(2) A =  , B =  , C = 

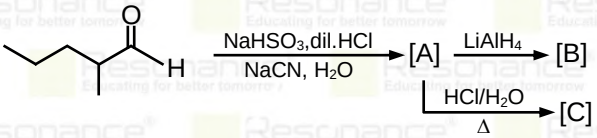
(3) A =  , B =  , C = 

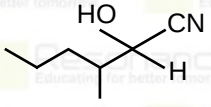
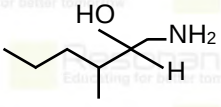
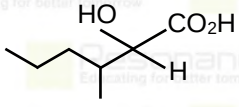
(4) A =  , B =  , C = 

NTA (3)

RESO (3)

Sol.



A =  , B =  , C = 

41. Which element is not present in Nessler's reagent ?

(1) Iodine (2) Oxygen (3) Mercury (4) Potassium

NTA (2)

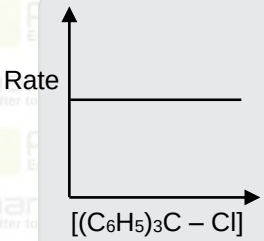
RESO (2)

Sol. Nessler's reagent is alkaline K_2HgI_4.

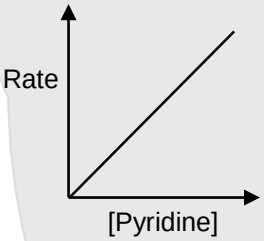
42. The graph which represents the following reaction is :

$$(C_6H_5)_2C - Cl \xrightarrow[\text{Pyridine}]{OH^-} (C_6H_5)_3C - OH$$

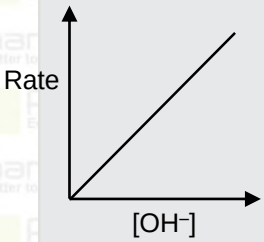
(1)



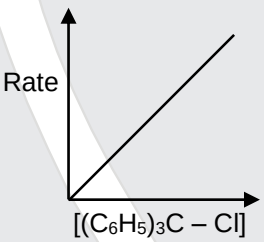
(2)



(3)



(4)



NTA (3)

RESO (3)

43. Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : Cu^{2+} in water is more stable then Cu^{2+}.

Reason (R) : Enthalpy of hydration for Cu^{2+} is much less than of Cu^{+}.

In the light of the above statements, choose the correct answer from the options given below :

(1) Both (A) and (R) are correct and (R) is the correct explanation of (A)

(2) (A) is correct but (R) is not correct

(3) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

(4) (A) is not correct but (R) is correct

NTA (1)

RESO (1)

Sol. In aqueous solution Cu^{+1} is unstable and it disproportionate.

$2Cu^{+1} \longrightarrow Cu(s) + Cu^{+2}(aq)$

Hydration energy of Cu^{2+} is higher than Cu^{+1} and this compensate it's ionisation energy.

44. Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : An aqueous solution of KOH when used for volumetric analysis, its concentration should be checked before the use.

Reason (R) : On aging, KOH solution absorbs atmospheric CO_2.

In the light of the above statements, choose the correct answer from the options given below :

(1) (A) is correct but (R) is not correct

(2) (A) is not correct but (R) is correct

(3) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

(4) Both (A) and (R) are correct and (R) is the correct explanation of (A)

NTA (4)

RESO (4)

Sol. $KOH + CO_2 \rightarrow K_2CO_3$

45. For electron gain enthalpies of the elements denoted as $\Delta_{eg}H$, the incorrect option is :

(1) $\Delta_{eg}H$ (Cl) < $\Delta_{eg}H$ (F)

(2) $\Delta_{eg}H$ (I) < $\Delta_{eg}H$ (At)

(3) $\Delta_{eg}H$ (Te) < $\Delta_{eg}H$ (Po)

(4) $\Delta_{eg}H$ (Se) < $\Delta_{eg}H$ (S)

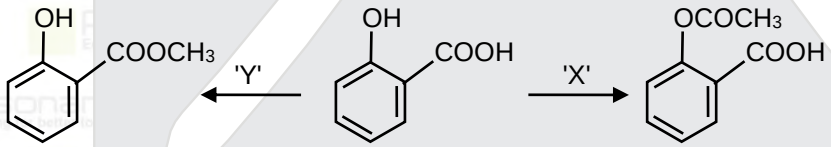
NTA (4)

RESO (4)

Sol. Negative electron gain enthalpy of C1 is more than F.

Negative electron gain enthalpy of S is more than Se.

46. In a reaction,



reagents 'X' and 'Y' respectively are :

(1) CH_3OH/H^+, Δ and CH_3OH/H^+, Δ

(2) $(CH_3CO)_2O/H^+$ and CH_3OH/H^+, Δ

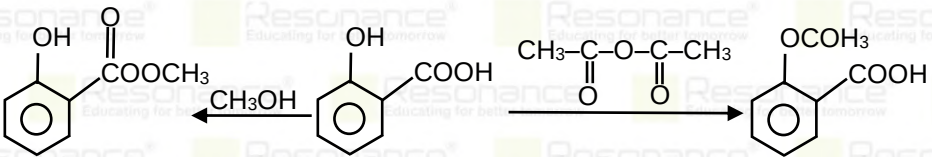
(3) $(CH_3CO)_2O/H^+$ and $(CH_3CO)_2O/H^+$

(4) CH_3OH/H^+, Δ and $(CH_3CO)_2O/H^+$

NTA (2)

RESO (2)

Sol.



47. Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : α-halocarboxylic acid on reaction with dill NH_3 gives good yield of α-amino carboxylic acid where as the yield of amines is very low when prepared form alkyl halides.

Reason (R) : Amino acids exist in zwitter ion form in aqueous medium.

In the light of the above statements, choose the correct answer form the options given below :

(1) Both (A) and (R) are correct and (R) is the correct explanation of (A)

(2) (A) is not correct but (R) is correct

(3) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

(4) (A) is correct but (R) is not correct

NTA (1)

RESO (1)

Sol. α-halocarboxylic acid react with dill NH_3 at faster then amines and Amino acids exist in zwitter ion form in aqueous medium.

48. Given below are two statements :

Statement I : Sulphanilic acid gives esterification test for carboxyl group.

Statement II : Sulphanilic acid gives red colour in Lassigne's test for extra element detection.

In the light of the above statements, choose the most appropriate answer from the option given below :

(1) Both Statement I and Statement II are correct

(2) Both Statement I and Statement II are incorrect

(3) Statement I is incorrect but Statement II is correct

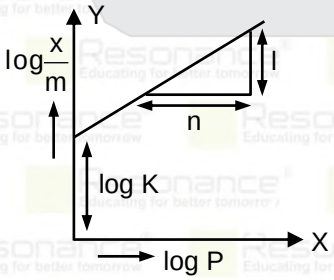
(4) Statement I is incorrect but Statement II is incorrect

NTA (3)

RESO (3)

Sol. Sulphanilic acid has no –COOH group hence no esterification test for carboxyl group. But it has Sulpher, and nitrogen atom hence gives red colour in Lassigne's test for extra element detection.

49. In figure, a straight line is given for Freundrich Adsorption (y = 3x + 2.505). The value of $\frac{1}{n}$ and log K are respectively.



(1) 3 and 2.505 (2) 3 and 0.7033 (3) 0.3 and log 2.505 (4) 0.3 and 0.7033

NTA (1)

RESO (1)

Sol. For straight line y = mx + c

$\log\left(\frac{x}{m}\right) = m[\log P] + C$

From freundlich adsorption

$\log\left(\frac{x}{m}\right) = \frac{1}{n}\log P + \log K$

so $\frac{1}{n} = 3$ and log K = 2.505

50. O – O bond length in H_2O_2 is X than the O – O bond length in F_2O_2. The O – H bond length in H_2O_2 is Y than that of the O – F bond in F_2O_2.

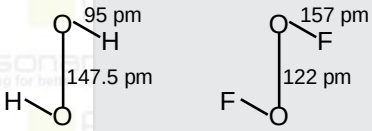
Choose the correct option for X and Y from those given below :

(1) X : Longer Y : Shorter
(2) X : Shorter Y : Longer
(3) X : Shorter Y : Shorter
(4) X : Longer Y : Longer

NTA (1)

RESO (1)

Sol.



O–O BL in H_2O_2 in longer then O–O BL in O_2F_2

O–H BL in H_2O_2 in shorter then O–F BL in O_2F_2

51. Among the following, the number of tranquilizer/s is/are _____ .

(1) Chloroliazepoxide
(2) Veronal
(3) Valium
(4) Salvarsan

NTA (3)

RESO (3)

Sol. Veronal, Valium, and Chlorodiazeproxide are tranquilizers.

52. 20% of acetic acid is dissociated when its 5g is added to 500 mL of water. The depression in freezing point of such water is _____ × 10^{-3}°C.

Atomci mass of C, H and O are 12, 1 and 16 a.m.u. respectively.

[Given : Molal depression constant and density of water are 1.86 K kg mol^{-1} and 1g cm^{-3} respectively.]

NTA (372)

Reso (372)

Sol. Degree of dissociation = 0.2

CH_3COOH

$\Delta T_f = K_f \times m \times i$

$= \frac{1.86 \times 5 \times 1.2}{0.5 \times 7}$

= 0.372

53. The molality of a 10% (v/v) solution of di-bromine solution in CCl4 (carbon tetrachloride) is 'x'.
x = _____ × 10^{-2} M. (Nearest integer)
[Given : molar mass of Br_2 = 160 g mol^{-1}
atomic mass of C = 12 g mol^{-1}
atomic mass of Cl = 35.5 g mol^{-1}
density of dibromine = 3.2 g cm^{-3}
density of CCl_4 = 1.6 g cm^{-3}]

NTA (139)
Reso (139)

Sol. Molarity 10% $\frac{V}{V}$
Solvent = CCl_4
Solvent = Br_2
100 mL has 10mL Br2 & 90 mL CCl_4
m = 10 × 3.0 = 32 g

$n = \frac{32}{160} = \frac{1}{5}$ mol

m_{CCl_4} = 90 × 1.6
=144 g
= 0.144 kg

$m = \frac{\frac{1}{5}}{0.144} = 1.39 = 139 \times 10^{-2}$

54. Among following compounds, the number of those present in copper matte is _____ .
A. $CuCO_3$ B. Cu_2S C. Cu_2O D. FeO

NTA (3)
Reso (3)
Sol. Copper matte as Cu_2S & FeS.

55. 0.3 g of ethane undergoes combustion at 27°C in a bomb calorimeter. The temperature of calorimeter system (including the water) is found to rise by 0.5°C. The heat evolved during (Nearest integer)
[Given : The heat capacity of the calorimeter system is 20kJ K^{-1}, R = 8.3 JK^{-1} mol^{-1}.
Assume ideal gas behaviour.
Atomic mass of C and H are 12 and 1g mol^{-1} respectively]

NTA (1006)
Reso (1006)
Sol. Moles of ethane = 0.1
$Q = C\Delta T = -1000$ kJ/mol
$\Delta H = \Delta E + \Delta n_g Rt$.
$\Delta n_g = -5/2$
$\Delta H = -1006$ kJ/mol.

56. 1×10^{-5} M $AgNO_3$ is added to 1 L of saturated solution of AgBr. The conductivity of this solution at 298 K is _____ $\times 10^{-8}$ S m^{-1}.

[Given : $K_{SP}(AgBr) = 4.9 \times 10^{-13}$ at 298 K

$\lambda^0_{Ag^+} = 6 \times 10^{-3}$ S m^2 mol^{-1}

$\lambda^0_{Br^-} = 8 \times 10^{-3}$ S m^2 mol^{-1}

$\lambda^0_{NO_3^-} = 7 \times 10^{-3}$ S m^2 mol^{-1}]

NTA (14)

Reso (13040)

Sol. 10^{-5}M $AgNO_3$ in saturate AgBr

$K_{sp} = (s + 10^{-5})\,(s)$

$= s(10^{-5}) = 4.9 \times 10^{-13}$

$s = 4.9 \times 40^{-8}$

solution has

$[Ag^+] = 10^{-5}$ $\left[NO_3^-\right] = 10^{-5}$

$[Br^-] = 5 \times 10^{-8}$

$$\lambda = \frac{K \times 1000}{C}$$

$$K_{Total} = \frac{\lambda_1 C_1}{1000} + \frac{\lambda_2 C_2}{1000} + \frac{\lambda_3 C_3}{1000}$$

$$\Rightarrow \frac{6 \times 10^{-3} \times 10^4 \times 10^{-5}}{1000} + \frac{7 \times 10^{-3} \times 10^4 \times 10^{-5}}{1000} + \frac{8 \times 10^{-3} \times 10^4 \times 10^{-8}}{1000}$$

$\Rightarrow 6 \times 10^{-7} + 7 \times 10^{-7} + 40 \times 10^{-10}$

$= 13.04 \times 10^{-7}$ $Scm^{-1} \Rightarrow 13.04 \times 10^{-5} Sm^{-1}$

$13040 \times 10{-}8$ Sm^{-1}

$= 13040$

57. A metal M crystallizes into two lattices :- face centred cubic (fcc) and body centred cubic (bcc) with unit cell edge length of 2.0 and 2.5 Å respectively. The ratio of densities of lattices fcc to bcc for the metal M is _____ . (Nearest integer)

NTA (4)

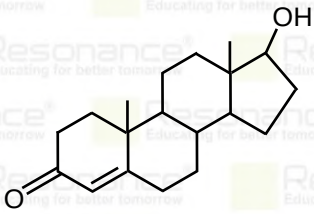
Reso (4)

Sol. Density $= \frac{Z \times M}{N_A (a)^3}$

For FCC Z = 4

For BCC Z = 2

58. Testosterone, which is a steroidal hormone, has the following structure.



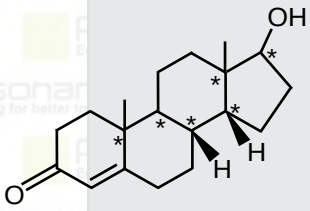
Testosterone

The total number of asymmetric carbon atom/s in testosterone is _____.

NTA (6)

Reso (6)

Sol.



Testosterone

Total number of unsymmetrical carbon = 6

59. The spin only magnetic moment of $[Mn(H_2O)_6]^{2+}$ complexes is _____ B.M. (Nearest integer)

(Given : Atomic no. of Mn is 25)

NTA (6)

Reso (6)

60. $A \rightarrow B$

The above reaction is of zero order. Half life of this reaction is 50 min. The time taken for the concentration of A to reduce to one-fourth of its initial value is _____ min. (Nearest integer)

NTA (75)

Reso (75)

Sol. Zero order

$t_{1/2} = 50$

$t_{3/4} = 1.5\ t_{1/2} = 75.$

Resonance®
Educating for better tomorrow

TO KNOW MORE
Call: 0744-2777777, 8441024095

TARGET: JEE (ADV.) 2023

Polish your subject knowledge with the guidance of
Top Notch Sr. Faculty of Resonance

SPARK

15 WEEKS COMPAC COURSE

OFFLINE / ONLINE

CLASS STARTS
6th FEBRUARY 2023

ACADEMIC FEATURES

- Course Duration: **15** Weeks
- Total No. of Lectures: **234** (P: 78 | C: 78 | M: 78)
- Duration of One Lecture: **1.5 hrs.** (90 Minutes)
- Classroom Teaching Hours.: **351** Hrs.
- Testing Duration: **60** Hrs.
- Total Academic Hours.: **411** Hrs.

Course Features

- Study Material
- Doubt Classes
- Back up support of recorded lectures
- Part/ Full Syllabus Test Series

Facilities for Offline Students

- In-house Computer Lab
- Self Study Rooms for Boys & Girls

TARGET: JEE (Main) 2023

Boost your Percentile with

PERCENTILE BOOSTER COURSE

8 WEEKS COMPAC COURSE

OFFLINE / ONLINE

CLASS STARTS
6th FEBRUARY 2023

COURSE FEATURES

- Complete Course Coverage
- 25 Chapter wise Test
- Regular Practice through 33 Daily Online Practice Test
- 5 Full Syllabus Test
- 3 Joint Preparatory Test
- Approx 2500 practice Que.
- 113 Teaching hours
- 99 Testing Hours
- Regular Test discussion classes for concept clearance
- Back up support of recorded lectures

Resonance®
Educating for better tomorrow

JEE (ADVANCED) 2022 RESULT

RESONites ने फिर लहराया सफलता का परचम

STUDENTS FROM CLASSROOM PROGRAM (OFFLINE/ ONLINE)

AIR 6

AIR-1 GEN-EWS

KARTHIKEYA POLISETTY
Roll No.: 21925115

AIR 8

DHEERAJ KURUKUNDA
Roll No.: 21925114

Students in TOP-100 All India Ranks (AIRs)

AIR-11
DEEVYANSHU MALU
Roll No.: 21219044

AIR-15
ABHIJEET ANAND
Roll No.: 21925116

AIR-35
SANSKAR SHAURYA
Roll No.: 21925113

AIR-50
ANIRUDH GARG
Roll No.: 21220122

AIR-54
SOUMITRA D. NAYAK
Roll No.: 21220554

AIR-58
KANISHK SHARMA
Roll No.: 21220454

ADMISSIONS OPEN FOR ACADEMIC SESSION 2023-24

TARGET: JEE (Adv.) 2024
for Class XII Passed Student
VISHESH COURSE
MODE: OFFLINE / ONLINE
CLASS STARTS 10th & 17th April

TARGET: JEE (Main) 2024
for Class XII Passed Student
ABHYAAS COURSE
MODE: OFFLINE / ONLINE
CLASS STARTS 10th & 24th April

SCHOLARSHIP ON THE BASIS OF JEE (MAIN) 2023 %ILE / AIR

Resonance Eduventures Limited
REGISTERED & CORPORATE OFFICE: CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Rajasthan) - 324005
Tel. No.: 0744-2777777, 2777700 | **CIN:** U80302RJ2007PLC024029

Social Media Connect
83067 41444 | youtube.com/@ResonanceEdu | t.me/OfficialResonance
facebook.com/ResonanceEdu | instagram.com/resonance_edu | in.linkedin.com/school/resonance-eduventures-ltd/ | twitter.com/ResonanceEdu