

JEE Main (Phase-II) 2020

Memory Based Questions & Solutions

SUBJECT

CHEMISTRY

Date: 02 September, 2020 (Shift-2)

Time: 3 PM to 6 PM

HAZRATGANJ

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1. Shapes of XeO_3F_2 and XeF_5^- will be respectively

- (1) Trigonal bipyramidal and pentagonal planar.
- (2) Octahedral and pentagonal bipyramidal
- (3) Octahedral and square pyramidal
- (4) See-saw and square pyramidal.

Ans: (1)

Sol. (i) XeO_3F_2 St. No. = 5
so hybridisation is $= \text{sp}^3\text{d}$
and structure is trigonal bipyramidal

(ii) XeF_5^- St. No. = $(5 + 2) = 7$
so hybridisation is $= \text{sp}^3\text{d}^2$
and structure is pentagonal planar.

2. Which complex will not show isomerism.

- (1) $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$
- (2) $[\text{Ni}(\text{en})_3]^{2+}$
- (3) $[\text{Ni}(\text{NH}_3)_2\text{Cl}_2]$
- (4) $[\text{Ni}(\text{NH}_3)_4(\text{H}_2\text{O})_2]^{2+}$

Ans: (3)

Sol: $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$: Square planar so geometrical isomerism is possible

$[\text{Ni}(\text{en})_3]^{2+}$: Octahedral so optical isomerism is possible

$[\text{Ni}(\text{NH}_3)_2\text{Cl}_2]$: Tetrahedral and no isomerism is possible

$[\text{Ni}(\text{NH}_3)_4(\text{H}_2\text{O})_2]^{2+}$: Octahedral and geometrical isomerism is possible

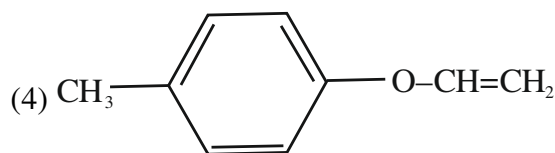
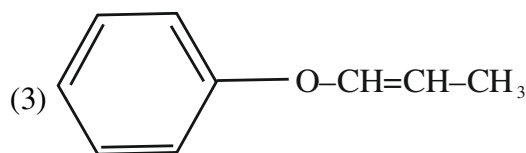
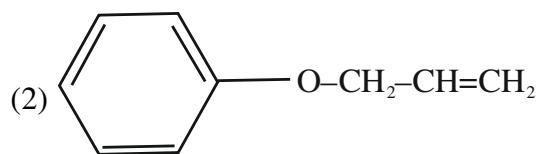
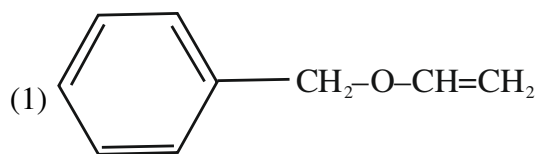
3. Which of the following can be manufactured from cast iron ?

- (1) Wrought iron and pig Iron
- (2) Wrought iron and pig iron
- (3) Wrought iron and steel
- (4) Pig iron and steel

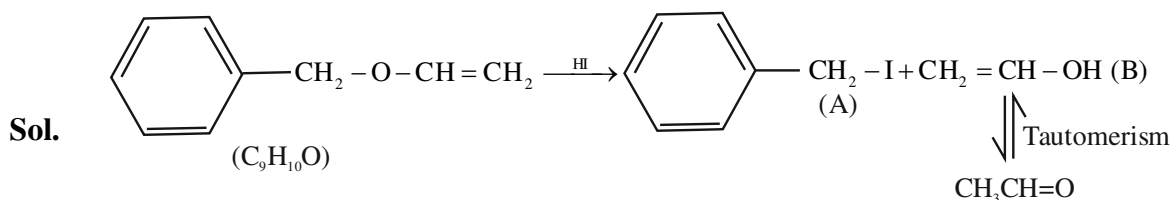
Ans: (3)

Sol. Iron obtained from Blast furnace is called as pig iron and cast iron is made by adding scrap iron in pig iron. Wrought iron is obtained by oxidising impurities of cast iron and steel is obtained from wrought iron.

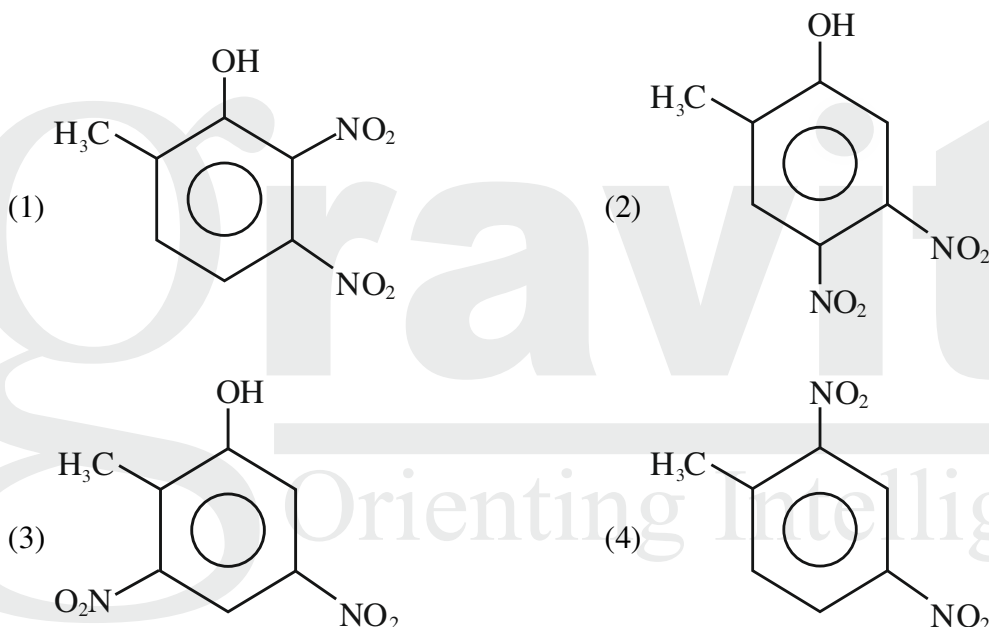
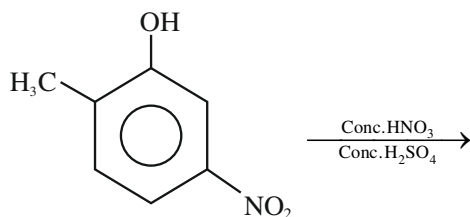
4. A compound with molecular formula $\text{C}_9\text{H}_{10}\text{O}$ (1) react with HI and produce two compounds B and C. B gives yellow ppt with AgNO_3 and C show positive iodoform test after tautomerisation. Identify the structure of compound A.



Ans: (3)



5. Major product of the following reaction is ?



Ans. (2)

Sol. This is electrophilic substitution reaction which product is determine by electronic effect of OH/CH₃/NO₂ directing effect is according to +M > H.C. > -M
so nitration will occur on para position w.r.t. -OH group



$$\text{Rate} = K \left[\text{tert-butyl bromide} \right]$$



$$\text{Rate} = \left[\text{tert-butyl bromide} \right] [\text{OH}^-]$$

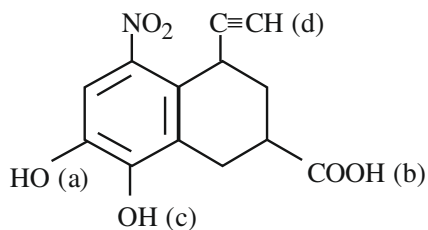
Correct statement regarding the above reactions, I and II.

- (1) Rate of both reaction become double if concentration of OH⁻ is doubled.
- (2) Rate of both reaction do not depend upon concentration of OH⁻.
- (3) Rate of reaction I remain unchanged if concentration of OH⁻ is increased.
- (4) Rate of reaction II remain unchanged if concentration of OH⁻ is increased.

Ans. (3)

Sol. First reaction is S_N¹ in which rate does not depend on conc. of nucleophile. Second reaction is E₂ reaction in which rate depends on conc. of base.

7. The correct order of acidic strenght is.



(1) $a > b > c > d$

(2) $b > c > a > d$

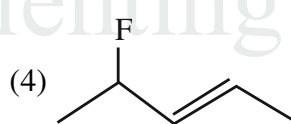
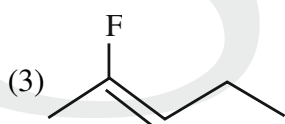
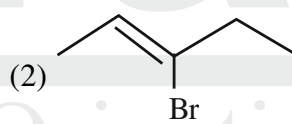
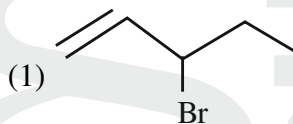
(3) $b > a > c > d$

(4) $c > b > a > d$

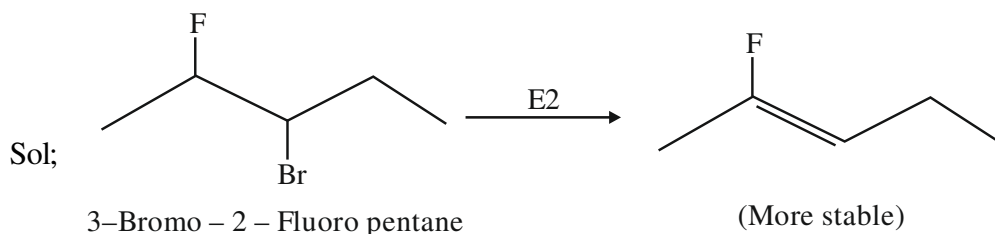
Ans. (2)

Sol. Stability of conjugated base \propto acidic strength

8. $\xrightarrow{\text{Alc. KOH}}$ Major product is:

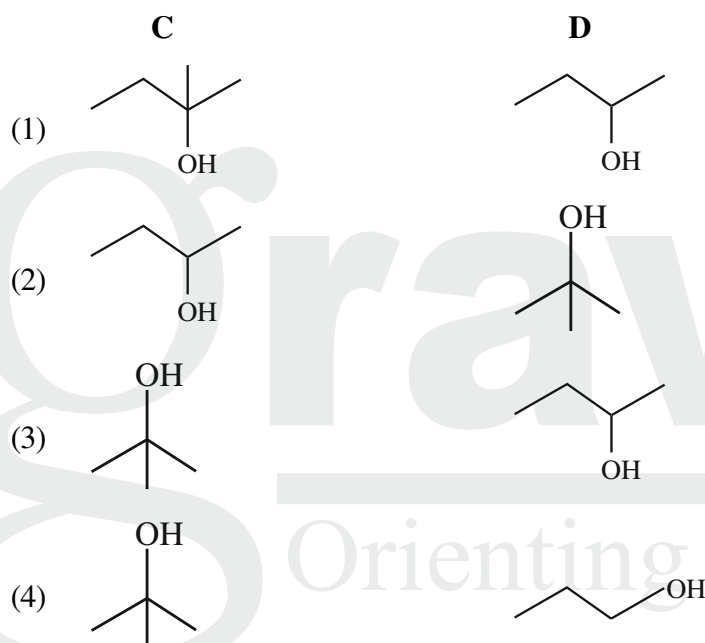


Ans. (2)

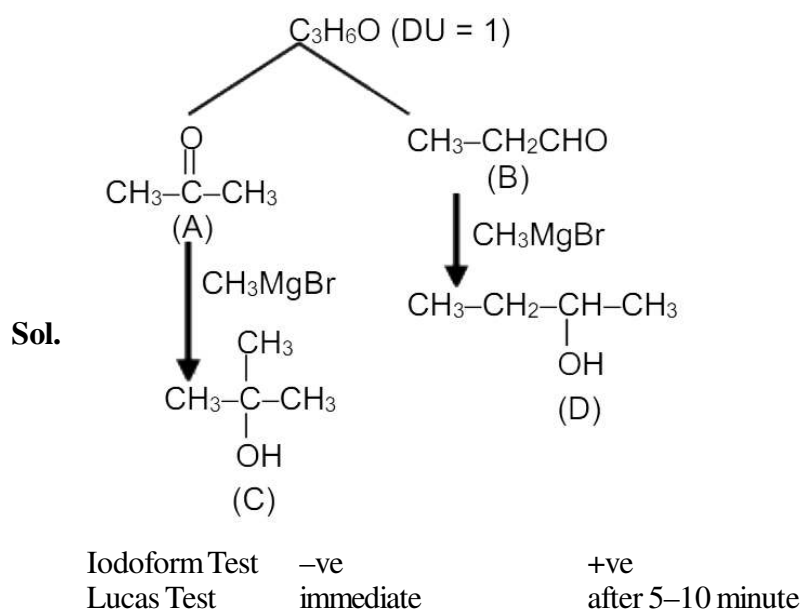


9. Two compounds A & B having molecular formula C_3H_6O when treated with CH_3MgBr gives C & D respectively. Identify C & D using following information.

	C	D
CAN Test	+ve test	+ve test
Lucas test	Gives turbidity instantaneously	Gives turbidity in 5 min
Iodoform test	+ve test	+ve test



Ans. (3)



10. Enthalpy of combustion of ethanol is - 327 Kcal/mol at constant pressure and 27° then calculate heat produced (in Kcal) when combustion is carried out at constant volume at same temperature

Ans. 327.6

Sol. Heat released at constant volume = $q_v = \Delta U$

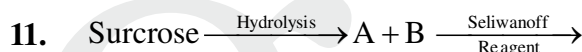
$$\Delta H = \Delta U + \Delta n_g RT$$

$$\Delta H_g = 2 - 3 = -1$$

$$\Delta U = \Delta H - \Delta n_g RT$$

$$= -327 \times 1000 - (-1) \times 2 \times 300$$

$$\Delta U = -327600 \text{ cal/mol} = -327.6 \text{ Kcal/mol}$$



Which colour is obtained after above reaction?

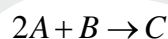
- (1) Red (2) Violet (3) Blue (4) Black

Ans. (1)

Sol. Seliwanoff's reagent \rightarrow [Resorcinol + Conc. HCl]

Use of Seliwanoff's reagent is to distinguish aldoses and ketoses. Ketoses show red colour with Seliwanoff's reagent.

12. For the reaction



Following experimental data are collected.

Exp.No	A $\left[\frac{\text{Mole}}{\text{lit}}\right]$	B $\left[\frac{\text{Mole}}{\text{lit}}\right]$	Rate [mole / Lit sec]
1	0.1	0.1	6×10^{-3}
2	0.2	0.2	1.2×10^{-2}
3	0.1	0.2	2.4×10^{-2}
4	X	0.2	7.2×10^{-2}
5	0.3	Y	2.88×10^{-1}

Find X and Y

- (1) 0.2, 0.3 (2) 0.3, 0.4 (3) 0.4, 0.3 (4) 0.3, 0.2

Ans. (2)

Sol. Rate = $k[A]^a[B]^b$

from Exp (1) & (2) $a = 1$

from Exp (1) & (3) $b = 2$

from Exp 3 & 4 $\Rightarrow 3 = \left(\frac{X}{0.1}\right)^1$ so $x = 0.3$

$$(4)^2 = \left(\frac{Y}{0.1}\right)^2 \text{ so } y = 0.4$$

13. If you spill chemical toilet cleaner on your hand what will be the used for primary treatment

- (1) aq. NaOH solution (2) aq. NaHCO₃ solution
(3) aq. NH₃ solution (4) aq. Na₂CO₃ solution

Ans. (4)

Sol. Fact

14. Which statement is correct when adsorption of gas take place on metal surface ?

- (1) ΔH becomes less negative with progress of reaction.
(2) With progress of reaction the strenght of residual forces increases.
(3) NH₃ is adsorbed more than N₂
(4) Equilibrium concentration of adsorbate increases with increase in temperture.

- (1) 1, 3 (2) 1, 2 (3) 2, 4 (4) 2, 3

Ans. (1)

Sol. (1) When gas is adsorbed on metal surface. ΔH become less negative with progress of reaction.

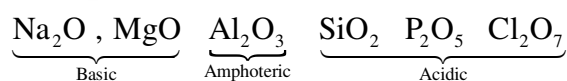
(3) gas with greater value of cirtical temperature (T_c) absorbed more. At T_c (NH₃) > T_c(N₂) So NH₃ is absorbed more than N₂

15. Three element of 3rd period x,y,z such that oxide of x is acidic, y is amphoteric and z is basic, the order of atomic no. of three elements is:

- (1) $x > y > z$ (2) $y > x > z$ (3) $z > x > y$ (4) $x > z > y$

Ans. (1)

Sol. On moving left to right in a period
Acidic character of oxides is increase
3rd period element oxides.



Acidic strength \uparrow ; Atomic number of Central Atom \uparrow

so Z have minimum atomic No

& X have maxima atomic No.

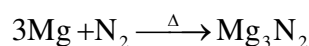
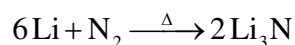
So correct order is $X > Y > Z$

16. Element A and B do not form solid bicarbonate but reacts with N₂ to give nitrides. Which of the following can be A and B ?

- (1) Li, Mg (2) Rb, Na (3) Ca, Cs (4) Ca, Na

Ans. (1)

Sol. Li and Mg do not form solid bicarbonate. But react with N₂ to give nitrides.



17. The structure of SF_6 is octahedral. What is the structure of SF_4 [including the lone pairs if any] ?

- (1) trigonal bipyramidal (2) pyramidal
(3) square planar (4) trigonal planar

Ans. (1)

Sol. $\text{SF}_4 \Rightarrow$ Steric No. = 5 so hybridisation is $\text{sp}^3 \text{d}$.



Structure is trigonal bipyramidal but shape is "See Saw"

18. Match the following, proportionally with distance according to their interaction energy.

Species interaction	Interaction Energy Proportionality
(i) ion – ion	(1) $\propto \frac{1}{r}$
(ii) Dipole – dipole	(2) $\propto \frac{1}{r^2}$
(iii) London dispersion	(3) $\propto \frac{1}{r^3}$
	(4) $\propto \frac{1}{r^6}$

Which of the following is correct match ?

- (1) (i) – (1) ; (ii) – (3); (iii) – (4)
(2) (i) – (1) ; (ii) – (3); (iii) – (1)
(3) (i) – (2) ; (ii) – (3); (iii) – (4)
(4) (i) – (3) ; (ii) – (2); (iii) – (1)

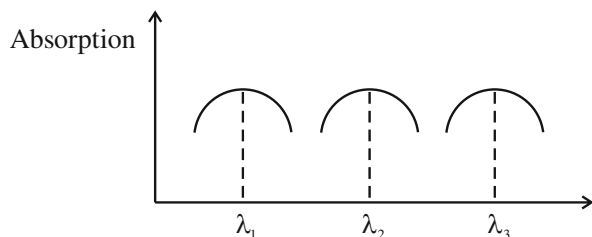
Ans. (1)

Sol. (i) ion-ion interaction energy is inversely proportional to the distance between ions $\left(\frac{1}{r}\right)$.

(ii) dipole-dipole interaction energy is inversely proportional to the third power of $r \left(\frac{1}{r^3}\right)$

(iii) The interaction energy of London force is inversely proportional to sixth power of distance between two interaction particles $\left(\frac{1}{r^6}\right)$

19. The absorption spectra of three sample A,B,C is given:



Sample	Compound
(1) A	$[\text{Fe}(\text{NH}_3)_6]^{n+}$
(2) B	$[\text{FeF}_6]^{-6+n}$
(3) C	$[\text{Fe}(\text{NCS})_6]^{-6+n}$

Which of the following is correct match ?

- (1) A – λ_1 ; B – λ_2 ; C – λ_3 (2) A – λ_2 ; B – λ_3 ; C – λ_1
 (3) A – λ_1 ; B – λ_3 ; C – λ_2 (4) None of these

Ans. (3)

Sol. Stronger the ligand greater is splitting of d orbitals and smaller will be wave length of light absorbed.

The splitting power of ligands is $\text{NH}_3 > \text{NCS}^- > \text{F}^-$

So order of wavelength of light absorbed is $\lambda_{\text{NH}_3} < \lambda_{\text{NCS}^-} < \lambda_{\text{F}^-}$

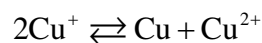
20. If a mango shrinks when kept in concentrated salt solution, then which of the following process take place ?

- (1) diffusion (2) dialysis
 (3) osmosis (4) reverse osmosis

Ans. (3)

Sol. When mango kept in concentrate salt solution then solvent (water) flow from mango to concentrate solution that's why mango shrinks this is called. "Osmosis"

21. For cell reaction



Find $\ln k = \dots \times 10^{-1}$

where k is equilibrium constant.

Given (i) $\text{Cu}^+ + e \rightarrow \text{Cu}$ $E^\circ = 0.52\text{V}$

(ii) $\text{Cu}^{2+} + e \rightarrow \text{Cu}^{+1}$ $E^\circ = 0.16\text{V}$

$$\left(\frac{RT}{F} = 0.025\right)$$

Ans. 144

Sol. $E_{\text{cell}}^0 = E_{\text{Cu}^+/\text{Cu}}^0 - E_{\text{Cu}^{2+}/\text{Cu}^+}^0$
 $= 0.52 - 0.16$
 $= 0.36 \text{ V}$

$$E_{\text{cell}}^0 = \frac{RT}{nF} \ln K_{\text{eq}}$$

$$0.36 = \frac{0.025}{1} \ln k$$

$$\ln k = 14.4$$

$$= 144 \times 10^{-1}$$

Ans. 144

- 22.** In a saturated acyclic compound the mass ratio of C:H is 4:1 and C:O is 3:4. Find the no. of moles of O_2 required to react with 2 moles of given compound to give CO_2 and water.

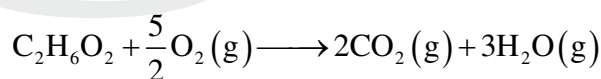
Ans. 5

Sol. Mass ratio of C : H is 4 : 1 \Rightarrow 12 : 3
 & C : O is 3 : 4 \Rightarrow 12 : 16

	Mass	mole	mole ratio
so C	12	1	1
H	3	3	3
O	16	1	1

Empirical formula $\Rightarrow \text{CH}_3\text{O}$

as compound is saturated acyclic so molecular formula is $\text{C}_2\text{H}_6\text{O}_2$



2 mole 5 mole 4 mole 6 mole

so required moles of $\text{O}_2 = 5$ mole

- 23.** A metal having work function $= 4.41 \times 10^{-19} \text{ J}$ is subjected to a light having wavelength 300 nm, then maximum kinetic energy of the emitted photoelectron is..... $\times 10^{-21} \text{ J}$.
 (Given $h = 6.63 \times 10^{-34} \text{ J/s}$ & $c = 3 \times 10^8 \text{ m/sec}$)

Ans. 222.00

E \searrow \nearrow KE

Sol.

Metal (work function = E_0)

$$E = E_0 + (KE)_{\text{max}}$$

$$\frac{hc}{\lambda} = 4.41 \times 10^{-19} + (KE)_{\text{max}}$$

$$\frac{6.63 \times 10^{-34} \times 3 \times 10^8}{300 \times 10^{-9}} - 4.41 \times 10^{-19} = (KE)_{\text{max}}$$

$$\begin{aligned} \text{So, } (KE)_{\text{max}} &= 6.63 \times 10^{-19} - 4.41 \times 10^{-19} \\ &= 2.22 \times 10^{-19} \\ &= 222 \times 10^{-21} \text{ J} \end{aligned}$$

24. Let the oxidation state of the transition element of compound $K_2Cr_2O_7$, $KMnO_4$ and K_2FeO_4 be X, Y and Z respectively, calculate $X+Y+Z$.

Ans. 19.00

Sol.	Compound	Oxidation state of transition element
(i)	$K_2Cr_2O_7$	$X = +6$
(ii)	$KMnO_4$	$Y = +7$
(ii)	K_2FeO_4	$Z = +6$
so $(X + Y + Z) = 19$		

25. No of subshells having $n = 4$ & $m = -2$ are:

Ans. 2

Sol. For $n = 4$ possible values of $\ell = 0, 1, 2, 3$ only $\ell = 2$ & $\ell = 3$ can have $m = -2$. So possible subshells are 2.

JEE Main - 2020

Best Result in U.P.



Aditya Pandey
Percentile
99.936
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Application No. 200310320565
DOB - 23-12-2002

65 Students Above 99 Percentile

145 Students Above 98 Percentile

208 Students Above 97 Percentile

SCHOOL INTEGRATED PROGRAM (SIP)

Tradition of Gravity Continues,
Once Again Historical Result,
100% Students Cracked
JEE Main
(Based on Last Yr Cut off)

2020

80 Out of 80
Cracked JEE Main
We had three Batches
of 55, 15 and 10.
Many Top Ranks are
from these Batches

2019

79 Out of 80 | **50 Out of 79**
in | in
JEE Main | JEE Adv.

2018

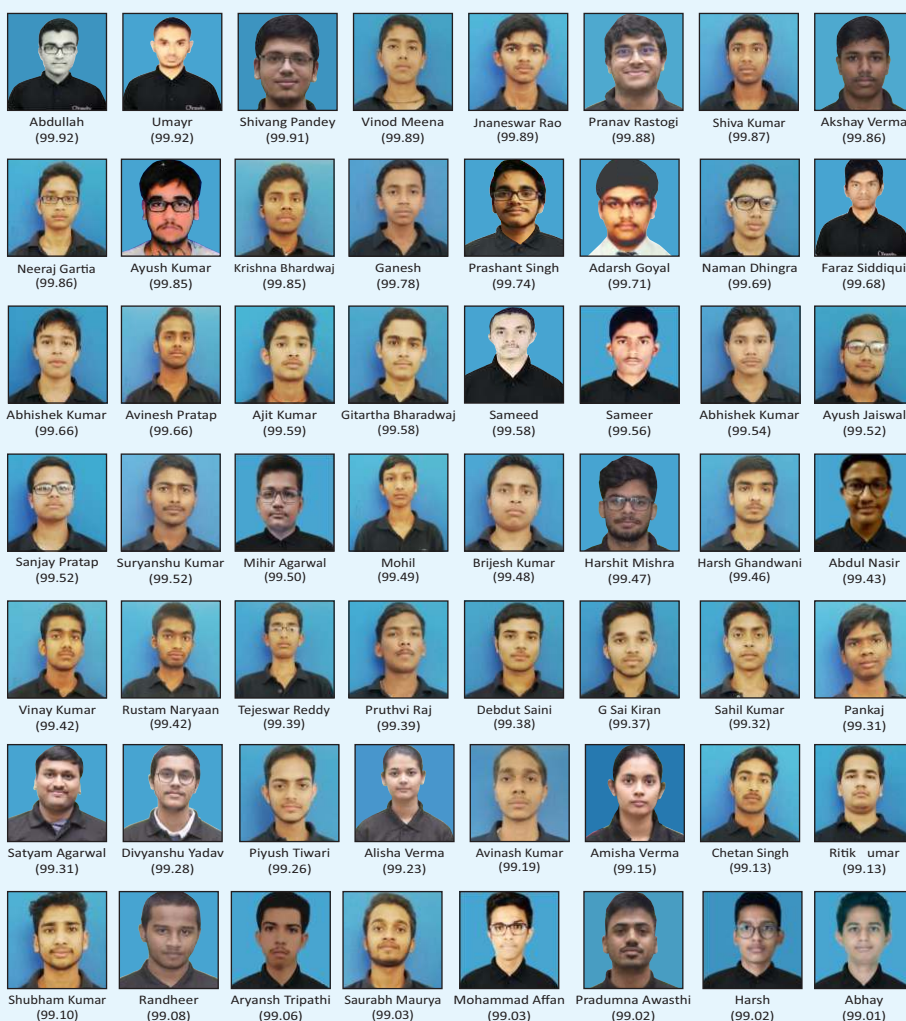
83 Out of 85 | **62 Out of 83**
in | in
JEE Main | JEE Adv.

2017

80 Out of 85 | **63 Out of 80**
in | in
JEE Main | JEE Adv.

2016

39 Out of 40 | **31 Out of 39**
in | in
JEE Main | JEE Adv.





Tarun

194
AIR
(General)



Aniket Agarwal

337
AIR
(General)



Shubh Sahu

494
AIR
(General)



Shlok Nemani

497
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50 out of 79 Cracked JEE Advanced from SIP (School Integrated Program)

4 Ranks under 500 (General Category) | 2 Ranks under 10 (Reserved Category)

126 Selections in JEE Advanced | 61 Students above 99 Percentile in JEE Main 2019



Sanjana

AIR - 3*



Akash

AIR - 4*



Priyanka

AIR - 68*



Bibek Lakra

AIR - 150*



Neha Raj

AIR - 177*



Arindam

AIR - 809
(General EWS)



Priyam

AIR - 1378
(General)



Mihir Chawla

AIR - 2237
(General)



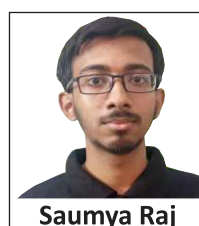
Madhur Kumar

AIR - 2382
(General)



Manish Kumar

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Saumya Raj

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