JEE Main (Phase-II) 2020

Memory Based Questions & Solutions

SUBJECT

MATHEMATICS

Date: 06 September, 2020 (Shift-1)

Time: 9 AM to 12 PM

1. If $\displaystyle\sum_{i=1}^{n}(x_i - a) = n$ and $\displaystyle\sum_{i=1}^{n}(x_i - a)^2 = na$ then the standard deviation of variate x_i

   (1) $\sqrt{a^2 - 1}$ (2) $\sqrt{a-1}$ (3) $\sqrt{n^2a - 1}$ (4) $\sqrt{a^2n^2 - n}$

Ans. (2)

Sol. $\text{S.D.} = \sqrt{\dfrac{\Sigma x_i^2}{n} - \left(\dfrac{\Sigma x_i}{n}\right)^2}$ $= \sqrt{\dfrac{\Sigma(x_i - a)^2}{n} - \left(\dfrac{\Sigma(x_i - a)}{n}\right)^2}$

$= \sqrt{\dfrac{n.a}{n} - \left(\dfrac{n}{n}\right)^2} = \sqrt{a-1}$

2. Negation of $p \vee (q \wedge \sim p)$ is

   (1) $p \wedge q$ (2) $\sim p \vee \sim q$ (3) $\sim p \vee q$ (4) $\sim p \wedge \sim q$

Ans. (4)

Sol. Given statement is $p \vee (q \wedge \sim p)$ is $\therefore$ Negation is $\sim(p \vee (q \wedge \sim p))$
$= (\sim p \wedge \sim q) \vee (\sim p \wedge p)$ $= (\sim p \wedge \sim q) \vee c$
$= \sim p \wedge \sim q$

3. There are three families in which 2 families has 3 members each and third family has 4 members. They are arranged in a line, then probability that members of same family are together, is

   (1) $\dfrac{1}{700}$ (2) $\dfrac{3}{700}$ (3) $\dfrac{3}{720}$ (4) $\dfrac{3}{730}$

Ans. (1)

Sol. $P(A) = \dfrac{3! \times 3! \times 3! \times 4!}{10!} = \dfrac{6 \times 6 \times 6}{10 \times 9 \times 8 \times 7 \times 6 \times 5} = \dfrac{1}{700}$

4. If roots of quadratic equation $x^2 - 64x + 256 = 0$ are α & β then $\left(\dfrac{\alpha^3}{\beta^5}\right)^{\frac{1}{8}} + \left(\dfrac{\beta^3}{\alpha^5}\right)^{\frac{1}{8}} =$

   (1) 2   (2) 6   (3) –2   (4) 5

Ans. (1)

Sol. $\alpha + \beta = 64 = 256$

Now $= \left(\dfrac{\alpha^3}{\beta^5}\right)^{\frac{1}{8}} + \left(\dfrac{\beta^3}{\alpha^5}\right)^{\frac{1}{8}}$ $= \dfrac{\alpha^{\frac{3}{8} + \frac{5}{8}} + \beta^{\frac{3}{8} + \frac{5}{8}}}{(\alpha\beta)^{5/8}} = \dfrac{\alpha + \beta}{(\alpha\beta)^{5/8}}$

$= \dfrac{64}{(256)^{5/8}} = \dfrac{64}{32} = 2$

5. $\displaystyle\lim_{x \to 1} \dfrac{\displaystyle\int_{0}^{(x-1)^2} t\cos t \, dt}{(x-1)\sin(x-1)}$ is equal to

   (1) 2   (2) 0   (3) 1   (4) Does not exist

Ans. (2)

Sol. $\displaystyle\lim_{x \to 1} \dfrac{2(x-1).(x-1)^2 \cos(x-1)^2}{2(x-1)} = 0$

6. Let $I_1 = \int\limits_0^1 (1-x^{50})^{100}\, dx$ and $I_2 = \int\limits_0^1 (1-x^{50})^{101}\, dx$ and $I_1 = \lambda . I_2,$ then λ is

(1) $\dfrac{5051}{5050}$ (2) $\dfrac{5050}{5051}$ (3) 1   (4) $\dfrac{5049}{5050}$

Ans. (1)

Sol. $\lambda = \dfrac{\int\limits_0^1 (1-x^{50})^{100}\, dx}{\int\limits_0^1 (1-x^{50})^{101}\, dx} = \dfrac{I_1}{I_2}$

$I_2 = \int\limits_0^1 (1-x^{50})(1-x^{50})^{100}\, dx$

$I_2 = I_1 - \int\limits_0^1 x.x^{49}(1-x^{50})^{100}\, dx$

$I_2 = I_1 - \left[\dfrac{-x(1-x^{50})^{101}}{5050}\right]_0^1 - \int\limits_0^1 \dfrac{(1-x^{50})^{101}}{5050}\, dx$

$I_2 = I_1 - \dfrac{I_2}{5050}$

$\Rightarrow \lambda = \dfrac{I_1}{I_2} = \dfrac{5051}{5050}$

7. If $\vec{a}, \vec{b}, \vec{c}\ \&\ \vec{d}$ are position vector of point A, B, C and D respectively in 3-D space no three of A, B, C, D are collinear and satisfy the relation $3\vec{a} - 2\vec{b} + \vec{c} - 2\vec{d} = 0$ then

(1) A, B, C and D coplanar
(2) the line joining points B and D divides the line joining points A and C in the ratio 2 : 1
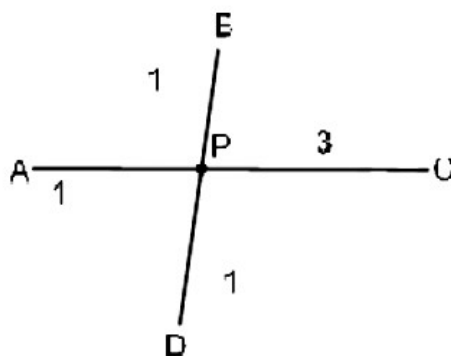(3) the line joining points A and C divides the line joining points B and D in the ratio 1 : 2
(4) the four vectors $\vec{a}, \vec{b}, \vec{c}\ \&\ \vec{d}$ are linearly independent

Ans. (1)

Sol. $3\vec{a} + \vec{c} = 2\left(\vec{b} + \vec{d}\right)$

$\dfrac{3\vec{a} + \vec{c}}{3+1} = \dfrac{\vec{b} + \vec{d}}{2}$

point P divides the line joining A and C in ratio 1 : 3 and bisects the line joining B and D

gravity
Orienting Intelligence

JEE Main - 2020 | Best Result in U.P.

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

65 Students Above 99 Percentile
145 Students Above 98 Percentile
208 Students Above 97 Percentile

Abdullah (99.92)	Umayr (99.92)	Shivang Pandey (99.91)	Vinod Meena (99.89)	Jnaneswar Rao (99.89)	Pranav Rastogi (99.88)	Shiva Kumar (99.87)	Akshay Verma (99.86)
Neeraj Gartia (99.86)	Ayush Kumar (99.85)	Krishna Bhardwaj (99.85)	Ganesh (99.78)	Prashant Singh (99.74)	Adarsh Goyal (99.71)	Naman Dhingra (99.69)	Faraz Siddiqui (99.68)
Abhishek Kumar (99.66)	Avinesh Pratap (99.66)	Ajit Kumar (99.59)	Gitartha Bharadwaj (99.58)	Sameed (99.58)	Sameer (99.56)	Abhishek Kumar (99.54)	Ayush Jaiswal (99.52)
Sanjay Pratap (99.52)	Suryanshu Kumar (99.52)	Mihir Agarwal (99.50)	Mohil (99.49)	Brijesh Kumar (99.48)	Harshit Mishra (99.47)	Harsh Ghandwani (99.46)	Abdul Nasir (99.43)
Vinay Kumar (99.42)	Rustam Naryaan (99.42)	Tejeswar Reddy (99.39)	Pruthvi Raj (99.39)	Debdut Saini (99.38)	G Sai Kiran (99.37)	Sahil Kumar (99.32)	Pankaj (99.31)
Satyam Agarwal (99.31)	Divyanshu Yadav (99.28)	Piyush Tiwari (99.26)	Alisha Verma (99.23)	Avinash Kumar (99.19)	Amisha Verma (99.15)	Chetan Singh (99.13)	Ritik umar (99.13)
Shubham Kumar (99.10)	Randheer (99.08)	Aryansh Tripathi (99.06)	Saurabh Maurya (99.03)	Mohammad Affan (99.03)	Pradumna Awasthi (99.02)	Harsh (99.02)	Abhay (99.01)

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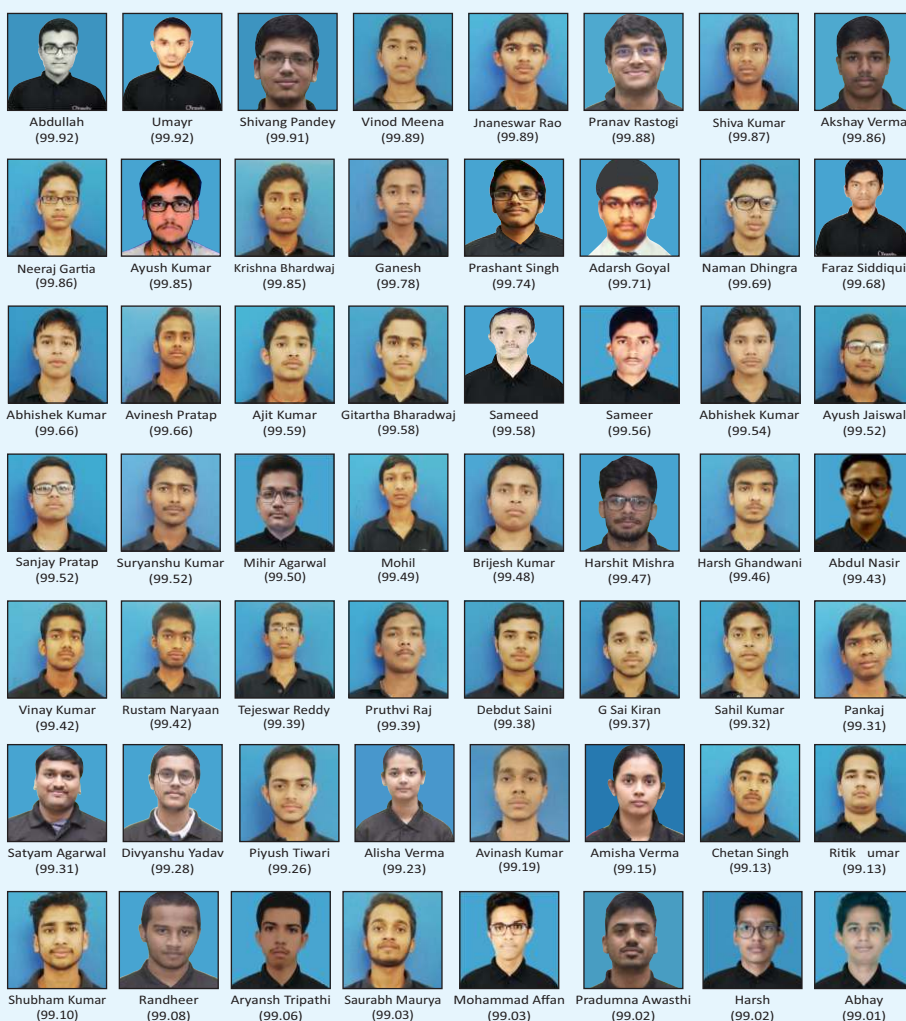| 79 Out of 80 in JEE Main	50 Out of 79 in JEE Adv.

2018
83 Out of 85 in JEE Main	62 Out of 83 in JEE Adv.

2017
80 Out of 85 in JEE Main	63 Out of 80 in JEE Adv.

2016
39 Out of 40 in JEE Main	31 Out of 39 in JEE Adv.

Selections Engineering 2019

gravity
Orienting Intelligence

194 AIR (General)
Tarun

337 AIR (General)
Aniket Agarwal

494 AIR (General)
Shubh Sahu

497 AIR (General)
Shlok Nemani

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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
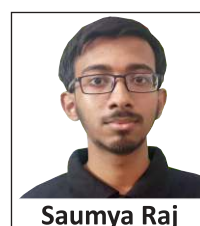
Sanjana	Akash	Priyanka	Bibek Lakra	Neha Raj	Arindam
AIR - 3*	AIR - 4*	AIR - 68*	AIR - 150*	AIR - 177*	AIR - 809 (General EWS)
Priyam	Mihir Chawla	Madhur Kumar	Manish Kumar	Saumya Raj	Raghav
AIR - 1378 (General)	AIR - 2237 (General)	AIR - 2382 (General)	AIR - 2388 (General)	AIR - 2656 (General)	AIR - 2659 (General)
Ritveek	Vanshaj	Subir Gupta	Aryan Rastogi	Devansh	Abhisht Bose
AIR - 2709 (General)	AIR - 2787 (General)	AIR - 2881 (General)	AIR - 3167 (General)	AIR - 3600 (General)	AIR - 3784 (General)