

JEE Main 2024 Mathematics Question Paper

April 4 Shift 1

Ques 1. If $f(x) =$

$$\begin{cases} x - 2, & 0 \leq x \leq 2 \\ -2, & -2 \leq x \leq 0 \end{cases}$$

and $h(x) = f(|x|) + |f(x)|$, $\int_0^k h(x) dx$ is equal to _____. ($k > 0$)

- A. 0
- B. $k/2$
- C. $2k$
- D. k

Ans. A

Ques 2. Find the number of rational numbers in the expansion of $(2^{1/5} + 5^{1/3})^{15}$.

- A. 3133
- B. 6131
- C. 931
- D. 633

Ans. A

Ques 3. Three urn A, B, C, A has 7 red and 5 black balls, B has 5 red and 7 black balls, C has 6 red and 6 black balls. One urn is selected and black ball is taken out. Find probability that the selected urn is A.

- A. 7/18
- B. 5/17
- C. 7/19
- D. 5/18

Ans. D

Find $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{\sin^2 x}{1+2^x} dx$

Ques 4.

- A. $\pi/4$
- B. $\pi/8$
- C. 4π
- D. $\pi/2$

Ans. A

Ques 5.

$$f(x) = \frac{2x^2 - 3x + 8}{2x^2 + 3x + 8}$$

Then sum of maximum and minimum values of $f(x)$ is:

- A. 136/55
- B. 146/55
- C. 146/11
- D. 136/11

Ans. B

Ques 6. The coefficient of x^7 in $(1 - x - x^2 + x^3)^6$

- A. 132**
- B. 144**
- C. -132**
- D. -144**

Ans. D

Ques 7. If $(z)^2 + |z| = 0$ and if α is sum of roots and β is product of non-zero roots, then find $4(\alpha^2 + \beta^2)$

- A. $\frac{1}{4}$**
- B. 1**
- C. 4**
- D. 2**

Ans. C

Ques 8. If the length of focal chord of $y^2 = 12x$ is 15 and if the distance of the focal chord from origin is p then $10p^2$ is equal to:

- A. 36**
- B. 25**
- C. 72**
- D. 144**

Ans. C

Ques 9.

$$\text{If } f(x) = \begin{cases} \frac{1-\cos x}{x^2} ; x < 0 \\ 2 ; x = 0 \\ \frac{\beta\sqrt{1-\cos x}}{x} ; x > 0 \end{cases}$$

is continuous at $x = 0$, then $\alpha^2 + \beta^2 = ?$

- A. 10
- B. 12
- C. 13
- D. 9

Ans. B

Ques 10. In $\triangle ABC$, there are 18 points. On side AB, there are P1, P2, P3, P4, P5. On BC, P6, P7, P8, P9, P10, P11 points. On CA, P12, ... , P18 points. By joining any three points from P1, P2, ... , P18 forms a triangle. How many triangles are possible.

Ans. 751

Ques 11.

$$\text{If } \lim_{x \rightarrow 1} \frac{(5x+1)^{\frac{1}{3}} - (x+5)^{\frac{1}{3}}}{(2x+3)^{\frac{1}{2}} - (x+4)^{\frac{1}{2}}} = \frac{m(5)^{\frac{1}{2}}}{n(2n)^{\frac{2}{3}}}$$

Then $8m + 12n$ is ?

Ans. 100

Ques 12. In a G.P., $T_1 = 2$, $T_2 = P$, $T_3 = Q$. These are also terms of an A.P. (7th, 8th & 13th term). If 5th term of G.P. = nth term of A.P., then find n.

Ans. 27