MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 30

Mathematics Single Choice

1. If C_r stands for ${}^nC_r$, then the coefficient of $\lambda^n \mu^n$ in the

expansion of

$[(1+\lambda)(1+\mu)(\lambda+\mu)]^n$ is :

A. $\sum_{r=0}^{n} C_r^2$

B. $\sum_{r=0}^{n} C_{r+2}^2$

C. $\sum_{r=0}^{n} C_{r+3}^2$

D. $\sum_{r=0}^{n} C_r^3$

Answer: D

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2. The point 'z' in Argand's plane

Moves such that

Re $\left(\frac{iz+1}{iz-1}\right) = 2,$ then locus of z is -

A. Straight line

B. circle

C. ellipse

D. hyperbola

Answer: B

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3. Let A be a square matrix such that

$a_{ij} \in \{-1, 01\} \forall i, j$ and it has

only one non-zero entry in each row

as well as in each column,then

A. A can be singular matrix

B. A must be skew symmetric

C. A must be symmetric

D. A must be orthogonal

Answer: D

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4. If the system of equations

$a = \frac{x}{y-z}, b = \frac{y}{z-x}$ and $C = \frac{z}{x-y}$ is consistent, then ab+bc+ca is

equal to

A. 0

B. 1

C. 2

D. none of these

Answer: D

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5. A committee of 6 is to be chosen from 10 men and 7 women so as to contain atleast 3 men and 2 women. The number of different ways in which this can be done if two particular women refuse to serve on the same committee

A. is less than 7000

B. lies between 7000 and 8000

C. lies between 8000 and 9000

D. is more than 9000

Answer: B

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6. Let $-\frac{\pi}{4} < \theta < -\frac{\pi}{6}$ suppose α_1

and β_1 are roots of the equation

$x^2 + 2x \text{ cosec } \theta + 1 = 0$ and α_2 and β_2

are roots of the equation

$x^2 + 2x \cot \theta - 1 = 0$. if

$\alpha_1 < \beta_1$ and $\alpha_2 > \beta_2$ then $\alpha_1 + \beta_2$

equals

A. $-2 \cot \theta$

B. $-2 \operatorname{cosec} \theta$

C. 0

D. none of these

Answer: C

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7. If

$$\sum_{k=1}^{n} \tan^{-1} \frac{2k}{2 + k^2 + k^4} = \tan^{-1}\left(\frac{6}{7}\right)$$

then the value of 2n is equal to

A. 2

B. 4

C. 6

D. 8

Answer: C

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8. Let A = {1,2,3}, then the

relation

R={(1,1),(1,2),(2,1)} on A is

A. reflexive

B. transitive

C. symmetric

D. none of these

Answer: C

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9. Let AB and CD are two parallel chords of circle whose radius is 5 units. If P and Q are mid points of AB and CD respectively such that P.A.PB=9,QC.QD=16, then distance between AB and CD is

A. 5

B. 25

C. 7

D. 11

Answer: C

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10. For an ellipse, the locus of mid points of chords which are drawn through an end of minor axis will be

A. a parabola

B. an ellipse

C. a hyperbola

D. a pair of lines

Answer: B

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11. The equation of a plane containing the line of intersection of the planes $2x - y - 4 = 0$ and $y + 2z - 4 = 0$ and passing through the point $(1,1,0)$ is :

A. $x + 3y + z = 4$

B. $x - y - z = 0$

C. $x - 3y - 2z = -2$

D. $2x - z = 2$

Answer: B

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12. Which of the following statements is correct.

A. Two non collinear vectors are always linearly dependent

B. Two parallel non zero vectors are always linearly independent

C. Any four vectors in 3 - d space are always linearly dependent

D. none of these

Answer: C

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13. The square of abscissa of the point on the curve $y = x^3$ where the tangent is parallel to chord joining points(1,1) and (5,125) is

A. $\frac{1}{3}$

B. $\frac{1}{10}$

C. $\frac{31}{3}$

D. $\frac{1}{5}$

Answer: C

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14. if $y = e^{3x}$, then $\left(\frac{d^2y}{dx^2}\right)\left(\frac{d^2x}{dy^2}\right)$ is

A. 1

B. e^{-3x}

C. $3e^{-3x}$

D. $-3e^{-3x}$

Answer: D

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15. If P denotes the number of point of intersection of $y^2 = 7x$ and $x^2 + y^2 - 4x + 2 = 0$, then value of $\lim_{x \to p} \frac{x \sin(\sin x) - \sin^2 x}{x^6}$ is .

A. $\frac{1}{6}$

B. $\frac{1}{18}$

C. $\frac{1}{12}$

D. $\frac{1}{24}$

Answer: B

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16. The integral

$$\int \frac{\left(\sin 2x + \cos^2 x\right) dx}{1 + \sin^2 x(\sin 2x - \cos^2 x)}$$ is equal to :-

(Where c is constant of integration)

A. $\tan^{-1}\left(\tan^2 x - \tan x\right) + c$

B. $\tan^{-1}\left(\tan^2 x + \tan x\right) + c$

C. $\cot^{-1}\left(\tan^2 x - \tan x\right) + c$

D. $\cot^{-1}\left(\tan^2 x + \tan x\right) + c$

Answer: B

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17. Solution of

$\sec^2 y \frac{dy}{dx} + x \tan y = x^3$ is

A. $\tan y = x^2 + ce^{x^2}$

B. $\tan y = x^2 - 2 + ce^{x^2}$

C. $\tan y = x^2 - 2 + ce^{-x^2/2}$

D. none of these

Answer: C

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18. Let P and q be two statements,

then $\sim(\sim p \wedge q) \wedge (p \vee q)$ is

logically equivalent to

A. q

B. $p \wedge q$

C. p

D. $p \vee \ -q$

Answer: C

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19. the variance of first 100 odd natural numbers is

A. 2222

B. 3333

C. 4444

D. 5555

Answer: B

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20. $\sum_{r=1}^{100} \frac{\tan 2^{r-1}}{\cos 2^r}$

A. $\tan 2^{99} - \tan 1$

B. $\tan 2^{100}$

C. $\tan 2^{100} - \tan 1$

D. none of these

Answer: C

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Mathematics Subjective Numerical

1. $\int_0^{\pi/4} \left(\tan^6(x-[x]) + \tan^4(x-[x])\right) dx$

is equal to (where $[.]$ is G.I.F.)

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2. The area of the region enclosed

between the parabolas

$y = x - bx^2$ and $y = \frac{x^2}{b}$ is

maximum. Then the positive

integral value of b is _____

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3. If the function

f(x)

$$= \lim_{x \to \infty} \frac{\sin\left(\pi + \pi x^{2n}\right) - \left(1 - x^{2n}\right)\tan(\pi x)}{1 + x^{2n} + x^{2n}\left(\sin(1 + x) - \cos\left(\pi \dot{x}\right)\right)}$$

and g(x)= $\begin{cases} x^2 + 5 : x > 1 \\ 2x + b : x \leq 1' \end{cases}$

then $\left(\lim_{x \to 1} f(x) + b\right)$ =(where g(x) is continuous $\forall x \in R$)

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4. If (m,n) represents the domain

of the function defined as

f(x)= $\sqrt{\log_0\left\{\frac{\log_0 x}{2(3-\log_0 x)}\right\}}$.

Find $\frac{n}{m}$

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5. The equation of a tangent to the

parabola $y^2 = 5x$ is

x+y=10. If from the point

(m,n) on this tangent the other

tangent drawn to the parabola is

perpendicular to the given tangent,

then the value of n-5 m is

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6. The minimum value of

$k = \sin^6 x + \cos^6 x$ is

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7. Find the reciprocal of the product of lengths of the perpendiculars drawn form any point on the hyperbola $x^2 - 2y^2 - 2 = 0$ to its asymptotes.

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8. For each point (x,y) on an ellipse, the sum of the distances from (x,y) to the points

(2,0)&(-2,0)is 8. if(x,3)

lies on the ellipse, where

$x > 0,$ then the value of x is

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9. If A and B are two events, odds

against A are 2:1 and odds in fovour of $A \cup B$

are 3 : 1 , and the

range of values of P(B) is [x,y],

then the value of $\frac{1}{y-z}$ is

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