

### MATHS

## **BOOKS - NTA MOCK TESTS**

### NTA TPC JEE MAIN TEST 42

**Mathematics Single Choice** 

1. Let 
$$(1 - x - 2x^2)^6 = 1 + a_1x + a_2x^2 + \ldots + a_{12}x^{12}$$
. Then  
 $\frac{a_2}{2^2} + \frac{a_4}{2^4} + \frac{a_6}{2^6} + \ldots + \frac{a_{12}}{2^{12}}$  is equal to  
A. -1  
B.  $-\frac{1}{2}$ 

**Answer: B** 

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2. Let z, w be two complex numbers such that |z| = 1 and  $\frac{w-1}{w+1} = \left(\frac{z-1}{z+1}\right)^2$ . Then maximum value of |w+1| is :-

A.  $\sqrt{2}$ 

B. 2

C. 1

D.  $1 + \sqrt{2}$ 

Answer: B

3. If (x, y) are the co-ordinates of a point in the plane, then

then  $\begin{vmatrix} 3 & 4 & 2 \\ 5 & 8 & 2 \\ x & y & 2 \end{vmatrix} = 0$  represent

A. a. st. line || to y-axis

B. a st., line || to x-axis

C. a st. lne

D. a circle

Answer: C



4. There are 7A & 6B and they are to be arranged linearly, then

number of palindromes are

A. 30

B.40

C. 50

D. None of these

Answer: D

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5. If range of 
$$f(x) = rac{x^2 - 3x + 2}{x^2 - ax + 4}$$
 is R – {1} then sum of all

possible real value(s) of 'a' is

A. 4

B. 3

C. 5

D. None

Answer: A



6. 
$$\lim_{n \to \infty} \sum_{x=1}^n \frac{2r-1}{2^r}$$
 is equal to -

$$\mathsf{B}.\,\frac{3}{2}$$

D. 6

#### Answer: C

7. Consider the following relations R= {(x, y) | x, y are real numbers and x = wy for some rational number w}  $S = \left\{ \left( \frac{m}{n}, \frac{p}{q} \right) \right\}$  where m, n, p and q are integers such that n,  $q \neq 0$  and qm = pn}. Then

A. both R, S are equivalence relations

B. R is an equivalence relation, but not S.

C. S is an equivalence relation, but not R.

D. neither R nor S is an equivalence relation.

Answer: C



**8.** If the locus of a point, whose chord of contact with respect to the circle  $x^2 + y^2 = 4$  is a tangent to the curve xy = 1 is

 $xy=c^2$  , then the value of  $c^2$  is

A. 2

C. 
$$\frac{1}{2}$$
  
D.  $\frac{1}{4}$ 

#### Answer: B



9. If the variable line y = kx + 2h is tangent to an ellipse  $2x^2 + 3y^2 = 6$ , then locus of P(h, k) is a conic C whose eccentricity equals

A. 
$$\frac{\sqrt{5}}{2}$$
  
B.  $\frac{\sqrt{7}}{3}$ 

C. 
$$\frac{\sqrt{7}}{2}$$
  
D.  $\sqrt{\frac{7}{3}}$ 

Answer: D

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10. If y = mx bisect two chords of  $y^2=4x$  from (4,4), then m

can't be

A. 
$$m=rac{3}{4}$$
  
B.  $m=rac{1}{2}$   
C.  $m=rac{5}{6}$   
D.  $m=-rac{1}{2}$ 

#### Answer: D



11. A line  $L_1 = \frac{x}{10} + \frac{y}{8} = 1$  intersects the coordinate axes at points A and B. Another line  $L_2$  perpendicular to  $L_1$  intersects the coordinate axes at C and D. The locus of circumcentre of  $\Delta ABD$  is

- A. 5x 4y = 9
- B. 5x 4y = 18
- C. 4x 5y = 9
- D. 4x 5y = 18

#### Answer: A

**12.** A plane meets the coordinate axes in points A, B, C and the centroid of the triangle ABC is  $(\alpha, \beta, \gamma)$ . The equation of the plane is

A. 
$$rac{x}{lpha}+rac{y}{eta}+rac{z}{\gamma}=3$$
  
B.  $lpha x+eta y+\gamma z=3lphaeta \gamma$   
C.  $rac{x}{lpha}+rac{y}{eta}+rac{z}{\gamma}=rac{1}{2}$ 

D. None of these

#### Answer: A

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**13.** Let  $\alpha \in R$  and the three vectors  $\overrightarrow{a} = \alpha \hat{i} + \hat{j} + 3\hat{k}, \overrightarrow{b} = 2\hat{i} + \hat{j} - \alpha \hat{k}$  and  $\overrightarrow{c} = \alpha \hat{i} - 2\hat{j} + 3\hat{k}$ . Then the set  $S = \left\{ \alpha : \overrightarrow{a}, \overrightarrow{b} \text{ and } \overrightarrow{c} \text{ are coplanar} \right\}$  A. is singleton

B. Contains exactly two numbers only one of which is positive

C. Contains exactly two positive numbers

D. is empty

Answer: D



14. If  $\lim_{x
ightarrow 0} \left(x^{-3}\sin 3x + ax^{-2} + b
ight)$  exists and is equal to 0,

then

A. a = -3 and b = 9/2

 $\texttt{B.}\,a=3 \,\, \text{and} \,\, b=9/2$ 

C. a = -3 and b = -9/2

D. a = 3 and b = -9/2

#### Answer: A



15. Consider  $f:R^+ o R$  such that f(3)=1 for  $a\in R^+$  and  $f(x)\cdot f(y)+figgl(rac{3}{x}iggr)figgl(rac{3}{y}iggr)=2f(xy)\,orall x,y\in R^+$  then f(97)

can be

A. 1

 $\mathsf{B.}-1$ 

C. 2

D. 97

#### Answer: A

16. Let $y(x)$ be a solution of $rac{(2+\sin x)}{(1+y)}rac{dy}{dx}=\cos x$ If $y(0)=2$ ,
then $y\Big(rac{\pi}{2}\Big)$ equals
A. $\frac{5}{2}$
B. 2
C. $\frac{7}{2}$

D. 3

### Answer: C



17. 
$$\int rac{dx}{(x-eta)\sqrt{(x-lpha)(eta-x)}}$$
 is A.  $rac{2}{lpha-eta}\sqrt{rac{x-lpha}{eta-x}}+c$ 

B. 
$$rac{2}{lpha-eta}\sqrt{(x-lpha)(eta-x)}+c$$
  
C.  $rac{lpha-eta}{2}(x-lpha)\sqrt{eta-x}$ 

D. None of these.

#### Answer: A



**18.** If the truth value of p, q and r are F,T and F respectively, then the truth value of

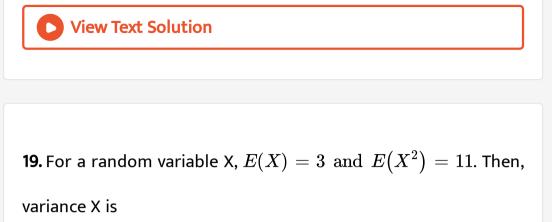
A. 
$$(p 
ightarrow q) \wedge (q 
ightarrow r)$$
 is true (T)

B. 
$$(p 
ightarrow q) \lor (q 
ightarrow r)$$
 is false (F)

C. 
$$(p 
ightarrow q) \leftrightarrow (q 
ightarrow r)$$
 is false (F)

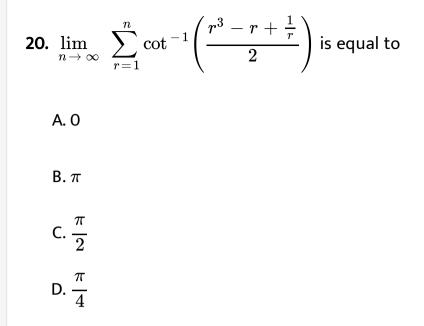
D. 
$$(p 
ightarrow q) 
ightarrow (q 
ightarrow r)$$
 is true (T)

# Answer: C



- A. 8
- B. 5
- C. 2
- D. 1

#### Answer: C



#### Answer: C



#### **Mathematics Subjective Numerical**

1. Let  $A=\left[a_{ij}
ight]_{3 imes3}$  be a matrix such that  $AA^T=4I$  and  $a_{ij}+2c_{ij}=0$  (where  $C_{ij}$  is the cofactor of  $a_{ij}$  and I is the unit

matrix of order 3). If the determinents are related by

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**2.** The rate at which surface area of the cube increases (in  $cm^2/$ 

sec), when the volume of a cube is increasing at a rate of 18  $cm^3$ 

/ sec and edge of the cube is 12cm, is

3. If 
$$y=2^{\log_2{(x)}^{2x}}+\left( an{\pi x}{4}
ight)^{rac{4}{\pi x}}$$
, then the value of  $rac{dy}{dx}$  at

x = 1 is

**4.** The value of the integral 
$$\int_{-10}^{1} \frac{\left|\frac{2[x]}{3x-[x]}\right|}{\frac{2[x]}{3x-[x]}}$$
, where [.] represents

GIF is p/q where p and q are relatively prime then p+q is equal to

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5. Find the area of the region in first quadrant in which points

are nearer to the origin then to the line x = 3

6. Let 
$$f(x) = \sin^{-1}\left(\frac{2x}{1+x^2}\right)$$
 and f is differentiable everywhere on R except at two isolated points, say  $x_1$  and  $x_2$ .

Then the value of  $x_1^2 + x_2^2$  is equal to

7. Tangents are drawn to the hyperbola  $x^2 - 9y^2 = 9$  from (3, 2). Find the area of the triangle that these tangents form with their chord of contact.

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8. If pth, qth and rth terms of a H.P. be respectively a, b and c then prove that (q-r)bc + (r-p)ca + (p-q)ab = 0

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**9.** ABC is a triangular park with AB = AC = 100 metres. A vertical tower is situated at the mid-point of BC. If the angles of elevation of the top of the tower at A and B are  $\cot^{-1}(3\sqrt{2})$ 

and  $\operatorname{cosec}^{-1}\!\left(2\sqrt{2}\right)$  respectively, then the height of the tower (in metres) is :

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**10.** Sum of all solutions in [0, 100] of the equation  $\sin \pi x + \cos \pi x = 0$ , is