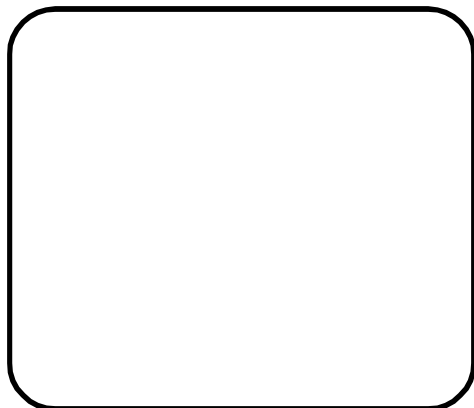


BOOKLET SERIES



02/02/2020

AFFIX PRESCRIBED RUBBER STAMP

CODE : OPQ-15/2020

Test Topic : TRIGONOMETRY-MATRIX-DETERMINANTS

MATHEMATICS

ROLL NO. (In figure)

Grid for Roll No. (8 boxes)

OMR SERIAL NO.

Grid for OMR Serial No. (6 boxes)

(Only in english)

OMR SERIAL NO. (In words).....

NAME OF THE CENTRE .....

TIME : 1 Hour

MM : 100

Signature of the invigilator

IMPORTANT INSTRUCTIONS

vko'; d funšk

- 1- The candidate will write his/her Roll No. only at the place provided for i.e. on the cover page and on answer sheet given and nowhere else.
2- Immediately on the receipt of the question booklet, the candidate all the pages and that on question is missing. If there is any discrepancy, it should be reported by the candidate to the invigilator within 10 minutes of issue of this question booklet without any discrepancy be obtained.

- 1- vH; Fkz viuk vupedk doy vkoj.k i'B rFkk izu i qLrdk dsl kFk fn; sx, mRrj&i=d dsfufn'V LFkku ij fy [kx} vU; = dgha ughA
2- izu i qLrdk feyus ds mi jkUr vH; Fkz dks rjUr tkp dj l fuf'pr dj yuK pkfg, fd i qLrdk eaij'si"B gsrFkk dkbz izu NW rksugha x; k gA ; fn dkbz fol xfr gsrks izu&i qLrdk feyus ds 10 feuV ds Hkhrj gh d{k fujh{k dks l fpr djuk pkfg, rFkk =qV jfgr nU jh i qLrdk i klr dj yuh pkfg, A

Numer of Questions : 50

AHABAD) Mob. 7800731619

# SHUKLA SIR MATHS CLASSES

M.M. : 100

MATHS

TIME : 1 Hour

T.G.T / P.G.T

(SHUKLA SIR MOB - 7800731619)

## Test Topic : TRIGONOMETRY-MATRIX-DETERMINANTS

1. The value of  $\sin^2 \frac{\pi}{8} + \sin^2 \frac{3\pi}{8} + \sin^2 \frac{5\pi}{8} + \sin^2 \frac{7\pi}{8}$  is :
- (a) 2 (b) 0 (c) 1 (d) None of these
2. If  $\sin x + \sin^2 x = 1$ , then the value of  $\cos^{12} x + 3\cos^{10} x + 3\cos^8 x + \cos^6 x + 2\cos^4 x + \cos^2 x - 2$  is =
- (a) 0 (b) 1 (c) 2 (d)  $\sin^2 x$
3.  $\left(1 + \cos \frac{\pi}{8}\right)\left(1 + \cos \frac{3\pi}{8}\right)\left(1 + \cos \frac{5\pi}{8}\right)\left(1 + \cos \frac{7\pi}{8}\right)$  is equal to :
- (a)  $\frac{1}{2}$  (b)  $\frac{\pi}{8}$  (c)  $\frac{1}{8}$  (d)  $\frac{1 + \sqrt{2}}{2\sqrt{2}}$
4. If  $\tan \alpha = 2\sin \alpha \sin \gamma \operatorname{cosec}(\alpha + \gamma)$ , then  $\cot \alpha, \cot \beta, \cot \gamma$  are in :
- (a) A.P. (b) G.P. (c) H.P. (d) None of these
5. In a triangle ABC,  $\tan \frac{A+B}{2} \cot \frac{A-B}{2}$  is equal to :
- (a)  $\frac{a-b}{a+b}$  (b)  $\frac{a+b}{c}$  (c)  $\frac{a+b}{a-b}$  (d) None of these
6. The equation  $\sin^2 \theta = \frac{x^2 + y^2}{2xy}$  is possible, if :
- (a)  $x = y$  (b)  $x = -y$  (c)  $2x = y$  (d) None of these
7. The value of  $\sin 10^\circ + \sin 20^\circ + \sin 30^\circ + \dots + \sin 360^\circ$  is :
- (a) 1 (b) 0 (c) -1 (d)
8. If  $r_1, r_2, r_3$  have three usual meanings, the value of  $\frac{1}{r_1} + \frac{1}{r_2} + \frac{1}{r_3}$  is :
- (a) 1 (b) 0 (c)  $\frac{1}{r}$  (d) None of these
9.  $\cos^2 \frac{A}{2} + \cos^2 \frac{B}{2} + \cos^2 \frac{C}{2} =$  :
- (a)  $2 - \frac{r}{2R}$  (b)  $2 + \frac{r}{2R}$  (c)  $2 - \frac{r}{R}$  (d) None of these

10. If in a  $\Delta ABC$ ,  $8R^2 = a^2 + b^2 + c^2$  then the triangle  $ABC$  is :
- (a) right angled (b) isosceles (c) equilateral (d) None of these
11. The equation  $\tan 2\theta = \tan\left(\frac{2}{\theta}\right)$  then  $\theta$  is equal to :
- (a)  $\frac{n\pi \pm \sqrt{n^2\pi^2 + 16}}{4}$  (b)  $\frac{n^2 \mp \sqrt{n^2\pi^2 - 16}}{4}$  (c)  $\frac{n^2 \pm \sqrt{n^2\pi^2 + 16}}{2}$  (d) None of these
12. If  $(1 + \tan \theta)(1 + \tan \varphi) = 2$  then general solution of  $(\theta + \varphi)$  is :
- (a)  $\theta + \varphi = n\pi + \frac{\pi}{4}$  (b)  $\theta + \varphi = n\pi \pm \frac{\pi}{4}$  (c)  $n\pi - \frac{\pi}{4}$  (d) None of these
13. The solution and the equation  $\tan(\pi \cot \theta) = \cot(\pi \tan \theta)$  :
- (a)  $\tan \theta = \frac{1 + \sqrt{-15}}{2}$  (b)  $\frac{1 + \sqrt{-15}}{4}$  (c)  $\frac{1 - \sqrt{-15}}{2}$  (d) None of these
14. If  $\sin(\pi \cos \theta) = \cos(\pi \sin \theta)$  then  $2\theta$  is equal to :
- (a)  $\sin^{-1}(3/4)$  (b)  $\sin^{-1}(1/4)$  (c)  $\cos^{-1}(3/4)$  (d) None of these
15. If  $\tan^{-1}\left(\frac{a+x}{a}\right) + \tan^{-1}\left(\frac{a-x}{a}\right) = \frac{\pi}{6}$  then the value of  $x^2$  is :
- (a)  $2\sqrt{3} a^2$  (b)  $2\sqrt{3} a$  (c)  $\sqrt{2\sqrt{3}} a^2$  (d) None of these
16. The solution of the equation,  $\sec^{-1} \frac{x}{a} - \sec^{-1} \frac{x}{b} = \sec^{-1} b - \sec^{-1} a$  is :
- (a)  $x = \pm ab$  (b)  $x = ab$  (c)  $x = -ab$  (d) None of these
17. The value of  $\tan^{-1} \sqrt{\frac{a(a+b+c)}{bc}} + \tan^{-1} \sqrt{\frac{b(a+b+c)}{ac}} + \tan^{-1} \sqrt{\frac{c(a+b+c)}{ab}}$  is :
- (a) 0 (b)  $\pi/2$  (c)  $\pi/3$  (d) None of these
18. In a  $\Delta ABC$  if  $b + c = 2a$  then  $\cos \frac{B-C}{2}$  is equal to :
- (a)  $2 \sin \frac{A}{2}$  (b)  $\sin \frac{A}{2}$  (c)  $\cos \frac{A}{2}$  (d) None of these
19. In a  $\Delta ABC$  if  $a \cos A = b \cos B$  the triangle are :
- (a) right angle (b) isocycles (c) both (d) equilateral
20. The function  $f(x) = \sqrt{\cos(\sin x)} + \sin^{-1}\left(\frac{1+x^2}{2x}\right)$  is defined for :
- (a)  $x \in \{-1, 1\}$  (b)  $x \in [-1, 1]$  (c)  $x \in R$  (d)  $x \in (-1, 1)$
21. A flag is fixed on a 50 meter high tower. If the angle of elevation of the top of the flag from a point at a distance equal to the height of the tower from the base of the tower is  $60^\circ$ , then height of the flag will be :
- (a)  $100(\sqrt{3} + 1)$  (b)  $50(\sqrt{3} + 1)$  (c)  $100(\sqrt{3} - 1)$  (d)  $50(\sqrt{3} - 1)$
22. If the sides of triangle are 13,14,15 then the radius of its in-circle is :
- (a)  $67/8$  (b)  $65/8$  (c) 4 (d) 24
23. In a triangle  $\Delta ABC$ , if  $\angle A = 120^\circ$  and  $AB = AC$ , then the value of  $\angle B$  and  $\angle C$  are respectively :
- (a)  $30^\circ, 30^\circ$  (b)  $15^\circ, 75^\circ$  (c)  $30^\circ, 60^\circ$  (d)  $30^\circ, 120^\circ$
24. The sides of a triangle are 12cm, 5cm and 13 cm then the radius of the circumcircle of the triangle is :
- (a) 5cm (b) 6.5cm (c) 13cm (d) None of these

25. In a right angled  $\triangle ABC$ ,  $\sin^2 A + \sin^2 B + \sin^2 C =$   
 (a) 0 (b) 1 (c)  $-1$  (d) None of these
26. The angles of depression of two points  $A$  and  $B$  on a horizontal plane such that  $AB = 200$  from the top  $P$  of a tower  $PQ$  of height 100 are  $45^\circ - \theta$  and  $45^\circ + \theta$ . If the line  $AB$  passes through  $Q$  the foot of the tower, then angle  $\theta$  is equal to :  
 (a)  $45^\circ$  (b)  $30^\circ$  (c)  $22.5^\circ$  (d)  $15^\circ$
27. The angle of elevation of the top of two vertical towers as seen from the middle point of the line joining the foot of the towers are  $60^\circ$  and  $30^\circ$  respectively. The ratio of the heights of the tower is :  
 (a) 2 : 1 (b)  $\sqrt{3} : 1$  (c) 3 : 2 (d) 3 : 1
28. Two vertical poles  $AL$  and  $BM$  of heights 20 m and 80 m respectively stand apart on a horizontal plane. If  $A, B$  be the feet of the poles and  $AM$  and  $BL$  intersect at  $P$ , then the height of  $P$  is equal to :  
 (a) 50 m (b) 18 m (c) 16 m (d) 15 m
29. The angle of elevation of the top of a tower standing on a horizontal plane from a point  $A$  is  $\alpha$ . After walking a distance  $d$  towards the foot of the tower, the angle of elevation is found to be  $\beta$ . The height of the tower is :  
 (a)  $\frac{d \sin \alpha \sin \beta}{\sin(\beta - \alpha)}$  (b)  $\frac{d \sin \alpha \sin \beta}{\sin(\alpha - \beta)}$  (c)  $\frac{d \sin(\beta - \alpha)}{\sin \alpha \sin \beta}$  (d)  $\frac{d \sin(\alpha - \beta)}{\sin \alpha \sin \beta}$
30. Two towers stand on a horizontal plane.  $P$  and  $Q$ , where  $PQ = 30$  m, are two points on the line joining their feet. As seen from  $P$  the angle of elevation of the tops of the towers are  $30^\circ$  and  $60^\circ$  but as seen from  $Q$  are  $60^\circ$  and  $45^\circ$ . The distance between the towers is equal to :  
 (a)  $15(4 + \sqrt{3})$  (b)  $15(4 - \sqrt{3})$  (c)  $15(3 + \sqrt{3})$  (d)  $15(2 + \sqrt{3})$
31. The value of determinant  $\begin{vmatrix} a+b+2c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{vmatrix}$  is equal to :  
 (a)  $2(a+b+c)^3$  (b)  $(a+b+c)^3$  (c)  $2(a+b+c)^2$  (d) None of these
32. The value of determinant  $\begin{vmatrix} a & b+c & a^2 \\ b & c+a & b^2 \\ c & a+b & c^2 \end{vmatrix}$  is equal to :  
 (a)  $-(a+b+c)(b-a)(c-a)(b-c)$  (b)  $-(a+b+c)(b-a)(c-a)(c-b)$   
 (c)  $(a+b+c)(b-a)(c-a)(c-b)$  (d) None of these
33. The value of determinant  $\begin{vmatrix} -a^2 & ab & ac \\ ab & -b^2 & bc \\ ac & bc & -c^2 \end{vmatrix}$  is equal to :  
 (a)  $a^2 b^2 c^2$  (b)  $2a^2 b^2 c^2$  (c)  $3a^2 b^2 c^2$  (d)  $4a^2 b^2 c^2$
34. If  $A = \begin{bmatrix} \alpha & \beta \\ \gamma & \delta \end{bmatrix}$  then find adjoint  $A$  is equal to :  
 (a)  $\begin{bmatrix} \delta & \beta \\ -\gamma & \alpha \end{bmatrix}$  (b)  $\begin{bmatrix} \delta & -\beta \\ -\gamma & -\alpha \end{bmatrix}$  (c)  $\begin{bmatrix} \delta & -\beta \\ -\gamma & \alpha \end{bmatrix}$  (d) None of these
35. The characteristic roots of a Hermitian matrix are all :  
 (a) imaginary (b) Real  
 (c) Non zero (d) None of these

36. If  $n \neq 3k$  and  $1, \omega, \omega^2$  are the cube roots of unity, then  $\Delta = \begin{vmatrix} 1 & \omega^n & \omega^{2n} \\ \omega^{2n} & 1 & \omega^n \\ \omega^n & \omega^{2n} & 1 \end{vmatrix}$  has the value :

- (a) 0 (b)  $\omega$  (c)  $\omega^2$  (d) 1

37. For positive numbers  $x, y$  and  $z$  the numerical value of the determinant  $\begin{vmatrix} 1 & \log_x y & \log_x z \\ \log_y x & 1 & \log_y z \\ \log_z x & \log_z y & 1 \end{vmatrix}$  is :

- (a) 0 (b) 1 (c)  $\log_e xyz$  (d) None of these

38.  $l, m, n$  are the  $p^{\text{th}}, q^{\text{th}}$  and  $r^{\text{th}}$  term of a G.P., all positive, then  $\begin{vmatrix} \log l & p & 1 \\ \log m & q & 1 \\ \log n & r & 1 \end{vmatrix}$  equals :

- (a)  $-1$  (b) 2 (c) 1 (d) 0

39. Let  $M$  and  $N$  be two even order non-singular skew-symmetric matrices such that  $MN = NM$ . If  $P^T$  denotes the transpose of  $P$ , then  $M^2 N^2 (M^T N)^{-1} (MN^{-1})^T$  is equal to :

- (a)  $M^2$  (b)  $-N^2$  (c)  $-M^2$  (d)  $MN$

40. If a matrix  $A$  is symmetric as well as skew symmetric, then :

- (a)  $A$  is a diagonal matrix (b)  $A$  is a null matrix (c)  $A$  is a unit matrix (d)  $A$  is a triangular matrix

41. Determinant of a skew symmetric matrix of even order is :

- (a) zero (b) positive (c) 1 (d) a non-zero perfect square

42. Let  $A = \begin{bmatrix} 1 & 1 & 3 \\ 5 & 2 & 6 \\ -2 & -1 & -3 \end{bmatrix}$ . Then  $A$  is :

- (a) Scalar (b) diagonal (c) nilpotent (d) idempotent

43. If  $A = \begin{bmatrix} 1 & 0 \\ -1 & 7 \end{bmatrix}$  and  $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ , then the value of  $k$ , so that  $A^2 = 8A + kI$  is :

- (a) 4 (b) 5 (c) 6 (d)  $-7$

44. If  $x, y, z$  are in A.P. then the value of the determinant  $\begin{vmatrix} a+2 & a+3 & a+2x \\ a+3 & a+4 & a+2y \\ a+4 & a+5 & a+2z \end{vmatrix}$  is :

- (a) 1 (b) 0 (c)  $2a$  (d)  $a$

45. If  $\alpha, \beta, \gamma$  are the roots of  $x^3 + ax^2 + b = 0$ , then the value of  $\begin{vmatrix} \alpha & \beta & \gamma \\ \beta & \gamma & \alpha \\ \gamma & \alpha & \beta \end{vmatrix}$  is :

- (a)  $-a^3$  (b)  $a^3 - 3b$  (c)  $a^3$  (d)  $a^2 - 3b$

46. The rank of the matrix  $\begin{bmatrix} -1 & 2 & 5 \\ 2 & -4 & a-4 \\ 1 & -2 & a+1 \end{bmatrix}$  is :

(a) 1 if a=6

(b) 1 if a = -16

(c) 1 if a = -6

(d) None of these

47. The value of  $\begin{vmatrix} 5^2 & 5^3 & 5^4 \\ 5^3 & 5^4 & 5^5 \\ 5^4 & 5^6 & 5^7 \end{vmatrix}$  is :

(a)  $5^2$

(b) 0

(c)  $5^{13}$

(d)  $5^9$

48. If A, B are square matrices of order 3, A is non-singular and  $AB = O$ , then B is a :

(a) null matrix

(b) non singular matrix

(c) singular matrix

(d) unit matrix

49. If  $A = \begin{bmatrix} 1 & 0 & 1 \\ 2 & 1 & 0 \\ 3 & 2 & 1 \end{bmatrix}$  then  $\det A =$  :

(a) 2

(b) 3

(c) 4

(d) 5

50. If  $A = \begin{bmatrix} 1 & 3 \\ 2 & 1 \end{bmatrix}$  then the determinant of  $A^2 - 2A$  is :

(a) 5

(b) 25

(c) -5

(d) -25

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02-02-2020

**MATH TEST – ANSWERS**

**Test Topic : *TRIGONOMETRY-MATRIX-DETERMINANTS***

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
<i>a</i>	<i>d</i>	<i>c</i>	<i>a</i>	<i>c</i>	<i>a</i>	<i>b</i>	<i>c</i>	<i>b</i>	<i>a</i>
11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
<i>a</i>	<i>a</i>	<i>b</i>	<i>a</i>	<i>a</i>	<i>a</i>	<i>a</i>	<i>a</i>	<i>c</i>	<i>a</i>
21.	22.	23.	24.	25.	26.	27.	28.	29.	30.
<i>d</i>	<i>c</i>	<i>a</i>	<i>b</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>c</i>	<i>a</i>	<i>a</i>
31.	32.	33.	34.	35.	36.	37.	38.	39.	40.
<i>a</i>	<i>b</i>	<i>d</i>	<i>c</i>	<i>b</i>	<i>a</i>	<i>a</i>	<i>d</i>	<i>c</i>	<i>b</i>
41.	42.	43.	44.	45.	46.	47.	48.	49.	50.
<i>d</i>	<i>c</i>	<i>d</i>	<i>b</i>	<i>c</i>	<i>c</i>	<i>b</i>	<i>a</i>	<i>a</i>	<i>b</i>

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