

**JEE MATHS**

*Topic: Trigonometric Ratios*

**Q.1** Which of the following is correct-

- (A)  $\sin 1^\circ > \sin 1$       (B)  $\sin 1^\circ < \sin 1$   
 (C)  $\sin 1^\circ = \sin 1$       (D)  $\sin 1^\circ = \frac{\pi}{180} \sin 1$

**Q.2** If  $\cos A = \frac{3}{4}$  then the value of  $\sin \frac{A}{2} \sin \frac{5A}{2}$  is-

- (A)  $\frac{1}{32}$                       (B)  $\frac{11}{8}$   
 (C)  $\frac{11}{32}$                       (D)  $\frac{11}{16}$

**Q.3** If  $\frac{2 \sin \alpha}{1 + \sin \alpha + \cos \alpha} = \lambda$  then  $\frac{1 + \sin \alpha - \cos \alpha}{1 + \sin \alpha}$  is equal to-

- (A)  $\frac{1}{\lambda}$                       (B)  $\lambda$   
 (C)  $1 - \lambda$                       (D)  $1 + \lambda$

**Q.4** The least value of

$\cos^2 \theta - 6 \sin \theta \cdot \cos \theta + 3 \sin^2 \theta + 2$  is-

- (A)  $4 + \sqrt{10}$                       (B)  $4 - \sqrt{10}$   
 (C) 0                                  (D) 4

**Q.5** If  $\sin \alpha + \sin \beta = a$  and  $\cos \alpha - \cos \beta = b$ , then  $\tan \left( \frac{\alpha - \beta}{2} \right)$  is equal to-

- (A)  $-\frac{a}{b}$                       (B)  $-\frac{b}{a}$   
 (C)  $\sqrt{a^2 + b^2}$                       (D) None of these

**Q.6** If ABCD is a cyclic quadrilateral, then the value of  $\cos A - \cos B + \cos C - \cos D$ -

- (A) 0
- (B) 1
- (C)  $2(\cos B - \cos D)$
- (D)  $2(\cos A - \cos C)$

**Q.7** The value of  $\cos \frac{\pi}{7} + \cos \frac{2\pi}{7} + \cos \frac{3\pi}{7} + \cos \frac{4\pi}{7} + \cos \frac{5\pi}{7} + \cos \frac{6\pi}{7} + \cos \frac{7\pi}{7}$  is-

- (A) 1
- (B) -1
- (C)  $1/2$
- (D) 0

**Q.8** If  $\tan\left(\frac{\alpha}{2}\right)$  and  $\tan\left(\frac{\beta}{2}\right)$  are the roots of the equation  $8x^2 - 26x + 15 = 0$  then  $\cos(\alpha + \beta)$  is equal to-

- (A)  $-\frac{627}{725}$
- (B)  $\frac{627}{725}$
- (C)  $-\frac{725}{627}$
- (D) -1

**Q.9** If  $\sin \theta_1 + \sin \theta_2 + \sin \theta_3 = 3$ , then

$\cos \theta_1 + \cos \theta_2 + \cos \theta_3 =$

- (A) 3
- (B) 2
- (C) 1
- (D) 0

**Q.10** If  $\sin A$ ,  $\cos A$  and  $\tan A$  are in G.P., then  $\cos^3 A + \cos^2 A$  is equal to-

- (A) 1
- (B) 2
- (C) 4
- (D) None of these

**Q.11** If  $x + \frac{1}{x} = 2 \cos \theta$ , then  $x^3 + \frac{1}{x^3} =$

- (A)  $\cos 3\theta$
- (B)  $2 \cos 3\theta$
- (C)  $\frac{1}{2} \cos 3\theta$
- (D)  $\frac{1}{3} \cos 3\theta$

**Q.12** Exact value of  $\tan 200^\circ$  ( $\cot 10^\circ - \tan 10^\circ$ ) is-

- (A) 1                      (B) 2  
(C) 0                      (D) None of these

**Q.13**  $\frac{\cos 20^\circ + 8 \sin 70^\circ \sin 50^\circ \sin 10^\circ}{\sin^2 80^\circ}$  is equal to -

- (A) 1                      (B) 2  
(C)  $\frac{3}{4}$                       (D) None of these

**Q.14** The sign of the product  $\sin 2 \sin 3 \sin 5$  is -

- (A) Negative              (B) Positive  
(C) 0                      (D) None of these

**Q.15**  $\frac{3 \cos \theta + \cos 3\theta}{3 \sin \theta - \sin 3\theta}$  is equal to-

- (A)  $1 + \cot^2 \theta$               (B)  $\cot^4 \theta$   
(C)  $\cot^3 \theta$                       (D)  $2 \cot \theta$

**Q.16** The value of  $\sin 10^\circ + \sin 20^\circ + \sin 30^\circ + \dots + \sin 360^\circ$  is equal to-

- (A) 0      (B) 1      (C)  $\sqrt{3}$                       (D) 2

**Q.17** The value of the expression

$(\sqrt{3} \sin 75^\circ - \cos 75^\circ)$  is -

- (A)  $2 \sin 15^\circ$               (B)  $1 + \sqrt{3}$   
(C)  $2 \sin 105^\circ$               (D)  $\sqrt{2}$

**Q.18**  $\cos 52^\circ + \cos 68^\circ + \cos 172^\circ =$

- (A) 0                      (B) 1  
(C) 2                      (D) None of these

**Q.19** If  $\operatorname{cosec} A + \cot A = \frac{11}{2}$ , then  $\tan A$  is -

- (A)  $\frac{21}{22}$     (B)  $\frac{15}{16}$     (C)  $\frac{44}{117}$     (D)  $\frac{117}{43}$

**Q.20** If triangle ABC,  $\angle C = \frac{2\pi}{3}$ , then the value of  $\cos^2 A + \cos^2 B - \cos A \cdot \cos B$  is equal to-

- (A)  $\frac{3}{4}$     (B)  $\frac{3}{2}$     (C)  $\frac{1}{2}$     (D)  $\frac{1}{4}$

**Q.21** If  $f(\theta) = 5 \cos \theta + 3 \cos \left( \theta + \frac{\pi}{3} \right) + 3$ , then range of  $f(\theta)$  is-

- (A)  $[-5, 11]$     (B)  $[-3, 9]$   
(C)  $[-2, 10]$     (D)  $[-4, 10]$

**Q.22**  $\cos^2 \frac{3\pi}{5} + \cos^2 \frac{4\pi}{5}$  is equal to -

- (A)  $4/5$     (B)  $5/2$     (C)  $5/4$     (D)  $3/4$

**Q.23** If  $\theta_1$  and  $\theta_2$  are two values lying in  $[0, 2\pi]$  for which  $\tan \theta = \lambda$ , then  $\tan \frac{\theta_1}{2} \cdot \tan \frac{\theta_2}{2}$  is -

- (A) Zero    (B)  $-1$     (C)  $2$     (D)  $1$

**Q.24** If  $A+B+C = \pi$ , then  $\sum \tan \frac{A}{2} \tan \frac{B}{2}$  is equal to -

- (A)  $0$     (B)  $-1$     (C)  $1/2$     (D)  $1$

**Q.25**  $\sin^2 \theta = \frac{(x+y)^2}{4xy}$ , where  $x \in \mathbb{R}$ ,  $y \in \mathbb{R}$ , gives real  $\theta$  if and only if -

- (A)  $x + y = 0$     (B)  $x = y$   
(C)  $|x| = |y| \neq 0$     (D) none of these

**Q.26** If  $a = \sin 170^\circ + \cos 170^\circ$ , then -

- (A)  $a > 0$     (B)  $a < 0$   
(C)  $a = 0$     (D)  $a = 1$

**Q.27**  $\sin^2 A + \sin^2(A - B) + 2 \sin A \cos B \sin(B - A)$  is equal to -

- (A)  $\sin^2 A$                       (B)  $\sin^2 B$   
 (C)  $\cos^2 A$                       (D)  $\cos^2 B$

**Q.28** If  $U_n = 2 \cos n\theta$ , then  $U_1 U_n - U_{n-1}$  is equal to -

- (A)  $U_{n+2}$                       (B)  $U_{n+1}$   
 (C)  $U_2 U_{n+1}$                       (D) None of these

**Q.29** The number of real solutions of the equation  $\sin(e^x) = 2^x + 2^{-x}$  is -

- (A) 1                                  (B) 0  
 (C) 2                                  (D) Infinite

**Q.30** If  $\cos 5\theta = a \cos^5 \theta + b \cos^3 \theta + c \cos \theta$  then  $c$  is equal to -

- (A) -5                                  (B) 1  
 (C) 5                                  (D) None of these

## ANSWER KEY

<b>Que.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
<b>Ans.</b>	B	C	B	B	B	A	B	A	D	A
<b>Que.</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>
<b>Ans.</b>	B	B	B	A	C	A	D	A	C	A
<b>Que.</b>	<b>21</b>	<b>22</b>	<b>23</b>	<b>24</b>	<b>25</b>	<b>26</b>	<b>27</b>	<b>28</b>	<b>29</b>	<b>30</b>
<b>Ans.</b>	D	D	B	D	C	B	B	B	B	C