



IMPORTANT INSTRUCTIONS :

All Questions are compulsory. Each correct answer carries 4 marks. No negative marks,

No mark is deducted if not attempted. All are single correct answers only.

Total No. of Questions : 45. Time duration : 90 M Max. Marks : 180M

Syllabus:

MATHEMATICS : Multiples & Submultiples

PHYSICS : Friction

CHEMISTRY : Chemical Properties to Nuclear fusion

MATHEMATICS

1. $\frac{\sin 3A}{\sin A} - \frac{\cos 3A}{\cos A} =$

A) 1

B) 2

C) 3

D) 4

2. $\cos^2\left(\frac{\pi}{4} - \frac{\theta}{2}\right) - \sin^2\left(\frac{\pi}{4} - \frac{\theta}{2}\right) =$

A) $\cos \theta$ B) $\sin \theta$ C) $\cos \frac{\theta}{2}$ D) $\sin \frac{\theta}{2}$

3. If $180^\circ < \theta < 270^\circ$ and $\sin \theta = -3/5$ then $\cos \theta / 2 =$

A) $-\frac{1}{\sqrt{10}}$ B) $\frac{1}{\sqrt{10}}$ C) $\frac{1}{10}$

D) 10

4. $\cos\left(\frac{\pi}{5}\right) \cos\left(\frac{2\pi}{5}\right) =$

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

5. If $A - B = 60^\circ$ then $\cos^2 A + \cos^2 B - \cos A \cos B =$

A) $\frac{1}{4}$ B) $\frac{3}{4}$ C) $\frac{5}{4}$ D) $\frac{1}{2}$

6. $\sin^3 20^\circ + \sin^3 40^\circ - \sin^3 80^\circ =$

- A) $\frac{3\sqrt{3}}{8}$ B) $-\frac{3\sqrt{3}}{8}$ C) $\frac{3\sqrt{3}}{2}$ D) 0

7. $\tan \alpha + 2 \tan 2\alpha + 4 \tan 4\alpha + 8 \cot 8\alpha =$

- A) $\sin \alpha$ B) $\cos \alpha$ C) $\tan \alpha$ D) $\cot \alpha$

8. $\frac{1 - \sec 8\theta}{1 - \sec 4\theta} =$

- A) $\sin 8\theta \cdot \cos 2\theta$ B) $\tan 8\theta \cdot \cot 2\theta$
 C) $\sec 8\theta \cdot \cot 2\theta$ D) $\tan 8\theta \cdot \tan 2\theta$

9. If $\frac{\tan 3A}{\tan A} = a \Rightarrow \frac{\sin 3A}{\sin A} =$

- A) $\frac{2a}{a-1}$ B) $\frac{2a}{a+1}$ C) $\frac{a}{a+1}$ D) $\frac{a}{a-1}$

10. If $0 < q < \frac{\pi}{2}$, $\sin 2q = \cos 3q$ then $\sin q =$

- A) $\frac{\sqrt{5}-1}{4}$ B) $\frac{1-\sqrt{5}}{4}$ C) $\frac{\sqrt{5}+1}{4}$ D) $-\left(\frac{\sqrt{5}+1}{4}\right)$

11. If $|\tan A| < 1$ and $|A|$ is acute, then $\frac{\sqrt{1+\sin 2A} + \sqrt{1-\sin 2A}}{\sqrt{1+\sin 2A} - \sqrt{1-\sin 2A}} =$

- A) $\tan A$ C) $\cot A$ B) $-\tan A$ D) $-\cot A$

12. If $\tan \theta + \tan\left(\theta + \frac{\pi}{3}\right) + \tan\left(\theta + \frac{2\pi}{3}\right) = 3$ then

- A) $\tan 3\theta = \frac{1}{2}$ B) $\tan 3\theta = 1$ C) $\tan 2\theta = 1$ D) $\tan 4\theta = 0$

13. If $\tan\left(\frac{\theta}{2}\right) = \operatorname{cosec} \theta - \sin \theta$ then the numerical value of $\cos^2 \frac{\theta}{2} =$

- A) $\frac{\sqrt{5}-1}{4}$ B) $\frac{\sqrt{5}+1}{4}$ C) $\frac{\sqrt{3}-1}{2\sqrt{2}}$ D) $\frac{\sqrt{3}+1}{2\sqrt{2}}$

14. $\sin^2 22^\circ + \sin^2 38^\circ + \sin 22^\circ \sin 38^\circ =$

A) $\frac{1}{4}$

B) $\frac{3}{4}$

C) $\frac{5}{4}$

D) $\frac{1}{2}$

15. $\sin^2 50^\circ + \sin^2 70^\circ + \sin 50^\circ \sin 70^\circ =$

A) $\frac{1}{2}$

B) 1

C) $\frac{3}{2}$

D) 2

PHYSICS

16. Which of the following statements is not true ?

A) Co-efficient of friction may be greater than unity.

B) Co-efficient of rolling friction is less than that of kinetic friction.

C) The frictional force is independent of the speed of the body.

D) The frictional force is inversely proportional to the normal reaction.

17. If the angle of repose is 45 degrees the coefficient of friction is ____.

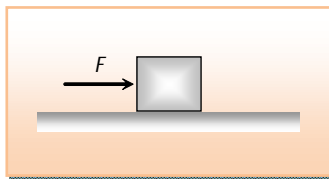
A) less than 1

B) more than 1

C) equal to 1

D) data insufficient

18. A block of mass 2 kg is kept on the floor. The coefficient of static friction is 0.4. If a force F of 2.5 N is applied on the block as shown in the figure, the frictional force between the block and the floor will be



A) 2.5 N

B) 5 N

C) 7.84 N

D) 10 N

19. Two bodies in contact but not moving with respect to each other can