

SELECTION TEST II
MATHEMATICS

- Q1. The value of $\cot 70^\circ + 4 \cos 70^\circ$ is
 (a) $\frac{1}{\sqrt{3}}$ (b) $\sqrt{3}$ (c) $2\sqrt{3}$ (d) $\frac{1}{2}$
- Q2. $\tan A + \cot(180^\circ + A) + \cot(90^\circ + A) + \cot(360^\circ - A)$ equal to
 (a) 0 (b) $2 \tan A$ (c) $2 \cot A$ (d) $2(\tan A - \cot A)$
- Q3. $\sin 75^\circ =$
 (a) $\frac{2 - \sqrt{3}}{2}$ (b) $\frac{\sqrt{3} + 1}{2\sqrt{2}}$ (c) $\frac{\sqrt{3} - 1}{2\sqrt{2}}$ (d) $\frac{\sqrt{3} - 1}{2\sqrt{2}}$
- Q4. $\frac{\sin \theta}{1 - \cot \theta} + \frac{\cos \theta}{1 - \tan \theta}$ equals to
 (a) 0 (b) 1 (c) $\cos \theta - \sin \theta$ (d) $\cos \theta + \sin \theta$
- Q5. The value of $6(\sin^6 \theta + \cos^6 \theta) - 9(\sin^4 \theta + \cos^4 \theta) + 4$ equals to
 (a) -3 (b) 0 (c) 1 (d) 3
- Q6. If $\sin x + \cos x = \frac{1}{5}$, then $\tan 2x$ is
 (a) $\frac{25}{17}$ (b) $\frac{7}{25}$ (c) $\frac{25}{7}$ (d) $\frac{24}{7}$
- Q7. $\sqrt{\frac{1 - \sin \theta}{1 + \sin \theta}}$ equals
 (a) 0 (b) 1 (c) $\sec \theta - \tan \theta$ (d) $\sec \theta \cdot \tan \theta$
- Q8. If $\sin \theta + \operatorname{cosec} \theta = 2$, then $\sin^2 \theta + \operatorname{cosec}^2 \theta =$
 (a) 1 (b) 4 (c) 2 (d) None of these
- Q9. The value of $5 \cos \theta + 3 \cos(\theta + \frac{\pi}{3}) + 3$ lies between
 (a) -4 and 4 (b) -4 and 6 (c) -4 and 8 (d) -4 and 10
- Q10. The angles of a quadrilateral are in A.P. and the greatest angle is 120° , the angles in radians are
 (a) $\frac{\pi}{3}, \frac{4\pi}{9}, \frac{5\pi}{9}, \frac{2\pi}{3}$ (b) $\frac{\pi}{3}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{3}$ (c) $\frac{5\pi}{18}, \frac{8\pi}{18}, \frac{11\pi}{18}, \frac{12\pi}{18}$ (d) None of these
- Q11. $\frac{\cot^2 15^\circ - 1}{\cot^2 15^\circ + 1} =$

GRAVITY CLASSES

(a) $\frac{1}{2}$ (b) $\frac{\sqrt{3}}{2}$ (c) $\frac{3\sqrt{3}}{4}$ (d) $\sqrt{3}$

Q12. For $A = 133^\circ$, $2 \cos \frac{A}{2}$ is equal to

(a) $-\sqrt{1 + \sin A} - \sqrt{1 - \sin A}$ (b) $-\sqrt{1 + \sin A} + \sqrt{1 - \sin A}$
 (c) $\sqrt{1 + \sin A} - \sqrt{1 - \sin A}$ (d) $\sqrt{1 + \sin A} + \sqrt{1 - \sin A}$

Q13. If $2 \tan A = 3 \tan B$, then $\frac{\sin 2B}{5 - \cos 2B}$ is equal to

(a) $\tan A - \tan B$ (b) $\tan(A - B)$
 (c) $\tan(A + B)$ (d) $\tan(A + 2B)$

Q14. If $90^\circ < A < 180^\circ$ and $\sin A = \frac{4}{5}$, then $\tan \frac{A}{2}$ is equal to

(a) $\frac{1}{2}$ (b) $\frac{3}{5}$ (c) $\frac{3}{2}$ (d) 2

Q15. If $\tan \alpha = \frac{1}{7}$ and $\sin \beta = \frac{1}{\sqrt{10}}$, then $\tan(\alpha + 2\beta)$ is equal to

(a) 1 (b) 0 (c) $\frac{1}{2}$ (d) $\frac{3}{4}$

Q16. If $\tan \frac{\theta}{2} = t$, then $\frac{1 - t^2}{1 + t^2}$ is equal to

(a) $\cos \theta$ (b) $\sin \theta$ (c) $\sec \theta$ (d) $\cos 2\theta$

Q17. The value of $\frac{\tan x}{\tan 3x}$ when ever defined never lie between

(a) $\frac{1}{3}$ and 3 (b) $\frac{1}{4}$ and 4 (c) $\frac{1}{5}$ and 5 (d) 5 and 6

Q18. If $\tan \theta = t$, then $\tan 2\theta + \sec 2\theta$ equal to

(a) $\frac{1+t}{1-t}$ (b) $\frac{1-t}{1+t}$ (c) $\frac{2t}{1-t}$ (d) $\frac{2t}{1+t}$

Q19. If $\tan x = \frac{b}{a}$, then $\sqrt{\frac{a+b}{a-b}} + \sqrt{\frac{a-b}{a+b}}$ equal to

(a) $\frac{2 \sin x}{\sqrt{\sin 2x}}$ (b) $\frac{2 \cos x}{\sqrt{\cos 2x}}$ (c) $\frac{2 \cos x}{\sqrt{\sin 2x}}$ (d) $\frac{2 \sin x}{\sqrt{\cos 2x}}$

Q20. The minimum value of $3 \cos x + 4 \sin x + 5 =$

(a) 5 (b) 9 (c) 7 (d) 0

GRAVITY CLASSES

PHYSICS

- Q1. If a car covers $\frac{2}{5}$ th of the total distance with v_1 speed and $\frac{3}{5}$ th distance with v_2 then average speed is
 (a) $\frac{1}{2}\sqrt{v_1v_2}$ (b) $\frac{v_1+v_2}{2}$ (c) $\frac{2v_1v_2}{v_1+v_2}$ (d) $\frac{5v_1v_2}{3v_1+2v_2}$
- Q2. A car accelerated from initial position and then returned at initial point, then
 (a) Velocity is zero but speed increases (b) Speed is zero but velocity increases
 (c) Both speed and velocity increase (d) Both speed and velocity decrease
- Q3. A man walks on a straight road from his home to a market 2.5 km away with a speed of 5 km/h. Finding the market closed, he instantly turns and walks back home with a speed of 7.5 km/h. The average speed of the man over the interval of time 0 to 40 min. is equal to
 (a) 5 km/h (b) $\frac{25}{4}$ km/h (c) $\frac{30}{4}$ km/h (d) $\frac{45}{8}$ km/h
- Q4. A train has a speed of 60 km/h for the first one hour and 40 km/h for the next half hour. Its average speed in km/h is
 (a) 50 (b) 53.33 (c) 48 (d) 70
- Q5. A person completes half of his journey with speed v_1 and rest half with speed v_2 . The average speed of the person is
 (a) $v = \frac{v_1+v_2}{2}$ (b) $v = \frac{2v_1v_2}{v_1+v_2}$ (c) $v = \frac{v_1v_2}{v_1+v_2}$ (d) $v = \sqrt{v_1v_2}$
- Q6. A car moving on a straight road covers one third of the distance with 20 km/hr and the rest with 60 km/hr. The average speed is
 (a) 40 km/hr (b) 80 km/hr (c) $46\frac{2}{3}$ km/hr (d) 36 km/hr
- Q7. A car, moving with a speed of 50 km/hr, can be stopped by brakes after at least 6m. If the same car is moving at a speed of 100 km/hr, the minimum stopping distance is
 (a) 6m (b) 12m (c) 18m (d) 24m
- Q8. A body A moves with a uniform acceleration a and zero initial velocity. Another body B, starts from the same point moves in the same direction with a constant velocity v . The two bodies meet after a time t . The value of t is
 (a) $\frac{2v}{a}$ (b) $\frac{v}{a}$ (c) $\frac{v}{2a}$ (d) $\sqrt{\frac{v}{2a}}$
- Q9. A student is standing at a distance of 50metres from the bus. As soon as the bus starts its motion with an acceleration of 1ms^{-2} , the student starts running towards the bus with a uniform velocity u . Assuming the motion to be along a straight road, the minimum value of u , so that the student is able to catch the bus is
 (a) 5ms^{-1} (b) 8ms^{-1} (c) 10ms^{-1} (d) 12ms^{-1}
- Q10. The velocity of a bullet is reduced from 200m/s to 100m/s while travelling through a wooden block of thickness 10cm. The retardation, assuming it to be uniform, will be
 (a) $10 \times 10^4 \text{ m/s}^2$ (b) $12 \times 10^4 \text{ m/s}^2$ (c) $13.5 \times 10^4 \text{ m/s}^2$ (d) $15 \times 10^4 \text{ m/s}^2$

GRAVITY CLASSES

- Q11. A body A starts from rest with an acceleration a_1 . After 2 seconds, another body B starts from rest with an acceleration a_2 . If they travel equal distances in the 5th second, after the start of A, then the ratio $a_1 : a_2$ is equal to
(a) 5 : 9 (b) 5 : 7 (c) 9 : 5 (d) 9 : 7
- Q12. The average velocity of a body moving with uniform acceleration travelling a distance of 3.06 m is 0.34 ms^{-1} . If the change in velocity of the body is 0.18 ms^{-1} during this time, its uniform acceleration is
(a) 0.01 ms^{-2} (b) 0.02 ms^{-2} (c) 0.03 ms^{-2} (d) 0.04 ms^{-2}
- Q13. A body travels for 15 sec starting from rest with constant acceleration. If it travels distances S_1, S_2 and S_3 in the first five seconds, second five seconds and next five seconds respectively the relation between S_1, S_2 and S_3 is
(a) $S_1 = S_2 = S_3$ (b) $5S_1 = 3S_2 = S_3$
(c) $S_1 = \frac{1}{3}S_2 = \frac{1}{5}S_3$ (d) $S_1 = \frac{1}{5}S_2 = \frac{1}{3}S_3$
- Q14. If a body having initial velocity zero is moving with uniform acceleration 8 m / sec^2 , the distance travelled by it in fifth second will be
(a) 36 metres (b) 40 metres (c) 100 metres (d) Zero
- Q15. A body starts from rest. What is the ratio of the distance travelled by the body during the 4th and 3rd second.
(a) 7/5 (b) 5/7 (c) 7/3 (d) 3/7
- Q16. A body sliding on a smooth inclined plane requires 4 seconds to reach the bottom starting from rest at the top. How much time does it take to cover one-fourth distance starting from rest at the top
(a) 1 s (b) 2 s (c) 4 s (d) 16 s
- Q17. A stone dropped from a building of height h and it reaches after t seconds on earth. From the same building if two stones are thrown (one upwards and other downwards) with the same velocity u and they reach the earth surface after t_1 and t_2 seconds respectively, then
(a) $t = t_1 - t_2$ (b) $t = \frac{t_1 + t_2}{2}$ (c) $t = \sqrt{t_1 t_2}$ (d) $t = t_1^2 t_2^2$
- Q18. By which velocity a ball be projected vertically downward so that the distance covered by it in 5th second is twice the distance it covers in its 6th second ($g = 10 \text{ m / s}^2$)
(a) 58.8 m / s (b) 49 m / s (c) 65 m / s (d) 19.6 m / s
- Q19. Water drops fall at regular intervals from a tap which is 5 m above the ground. The third drop is leaving the tap at the instant the first drop touches the ground. How far above the ground is the second drop at that instant
(a) 2.50 m (b) 3.75 m (c) 4.00 m (d) 1.25 m
- Q20. A balloon is at a height of 81 m and is ascending upwards with a velocity of 12 m / s . A body of 2 kg weight is dropped from it. If $g = 10 \text{ m / s}^2$, the body will reach the surface of the earth in
(a) 1.5 s (b) 4.025 s (c) 5.4 s (d) 6.75 s