Additional Problems For Self Practice (APSP)

PART - I : PRACTICE TEST PAPER

This Section is not meant for classroom discussion. It is being given to promote self-study and self testing amongst the Resonance students.

Max. Marks : 120 **Max. Time : 1 Hr.**

Important Instructions :

1. The test is of **1 hour** duration and max. marks 120.

2. The test consists **30** questions, **4 marks** each.

3. Only one choice is correct **1 mark** will be deducted for incorrect response. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.

4. There is only one correct response for each question. Filling up more than one response in any question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instructions 3 above.

1. If $\sin\theta + \cos\theta = m$ and $\sec\theta + \operatorname{cosec}\theta = n$, then

(1) $2n = m(n_2 - 1)$ (2) $2m = n(m_2 - 1)$ (3) $2n = m(m_2 - 1)$ (4) $2m = n_2(n - 1)$

2. The ratio of the greatest value of $2 - \cos x + \sin_2 x$ to its least value is

(1) $\frac{1}{4}$ (2) $\frac{9}{4}$ (3) $\frac{13}{4}$ (4) $\frac{7}{4}$

3. Which of the following is correct ?

(1) $\tan 1 = \tan 2$ (2) $\tan 1 = \frac{2}{3}\tan 2$ (3) $\tan 1 > \tan 2$ (4) $\tan 1 < \tan 2$

4. The smallest positive angle satisfying the equation $\sin_2\theta - 2\cos\theta + \frac{1}{4} = 0$ is

(1) $\frac{\pi}{2}$ (2) $\frac{\pi}{3}$ (3) $\frac{\pi}{4}$ (4) $\frac{\pi}{6}$

5. The most general value of θ for which $\sin\theta - \cos\theta = \min_{a \in R}(1, a_2 - 6a + 10)$ are given by

(1) $n\pi + (-1)_n \frac{\pi}{4} - \frac{\pi}{4}$ (2) $n\pi + (-1)_n \frac{\pi}{4} + \frac{\pi}{4}$ (3) $2n\pi + \frac{\pi}{4}$ (4) $(4n + 1)\frac{\pi}{2}$

6. The least difference between the roots, in the first quadrant $\left(0 \le x \le \frac{\pi}{2}\right)$ of the equation $4\cos x(2 - 3\sin_2 x) + (\cos 2x + 1) = 0$, is

(1) $\frac{\pi}{6}$ (2) $\frac{\pi}{4}$ (3) $\frac{\pi}{3}$ (4) $\frac{\pi}{2}$

7. If $\tan A = \frac{a}{a+1}$ and $\tan B = \frac{1}{2a+1}$, then the value of A + B is

(1) 0 (2) $\frac{\pi}{2}$ (3) $\frac{\pi}{3}$ (4) $\frac{\pi}{4}$

8. Which of the following is rational number ?
(1) sin 15° (2) cos 15° (3) sin 15° cos 15° (4) sin 15º cos 75°

9. If sin(A + B + C) = 1 , tan (A – B) = $\frac{1}{\sqrt{3}}$ and sec (A + C) = 2, then
(1) A = 90°, B = 60°, C = 30° (2) A = 120°, B = 60°, C = 0°
(3) A = 60°, B = 30°, C = 0° (4) A = 45°, B = 30°, C = 60°

10. The height of a house subtends a right angle at the opposite wide window. The angle of elevation of the window from the base of the house is 60º. If the width of the road is 6m , then the height of the house is
(1) $4\sqrt{3}$ (2) $6\sqrt{3}$ (3) $8\sqrt{3}$ (4)$10\sqrt{3}$

11. The general value of θ, obtained from the equation cos2θ = sin α , is
(1) θ = nπ ± ($\frac{\pi}{4} - \frac{\alpha}{2}$) (2) $\theta = \frac{n\pi + (-1)^n \alpha}{2}$ (3) θ = 2nπ ± $\left(\frac{\pi}{2} - \alpha\right)$ (4) 2θ = $\frac{\pi}{2}$ – α

12. Value of $\cos\frac{2\pi}{7} + \cos\frac{4\pi}{7} + \cos\frac{8\pi}{7} =$
(1) 1 (2) 2 (3) –1 (4) $-\frac{1}{2}$

13. The general solution of sinx + cosx = $\sqrt{2}$ cos A is
(1) x = 2nπ + $\frac{\pi}{4}$ ± A (2) x = 2nπ + $\frac{\pi}{3}$ ± A (3) x = 2nπ + $\frac{\pi}{6}$ ± A (4) x = nπ + $\frac{\pi}{2}$ ± A

14. The solution set of (2cos x–1) (3 + 2 cos x) = 0 in the interval 0 ≤ x ≤ 2π, is
(1) $\left\{\frac{\pi}{3}\right\}$ (2) $\left\{\frac{\pi}{3}, \frac{5\pi}{3}\right\}$ (3) $\left\{\frac{\pi}{3}, \frac{5\pi}{3}, \cos^{-1}\left(-\frac{3}{2}\right)\right\}$ (4) $\left(\frac{\pi}{6}, \frac{11\pi}{6}\right)$

15. If $\frac{\sin(x+y)}{\sin(x-y)} = \frac{a+b}{a-b}$, then $\frac{\tan x}{\tan y}$ is equal to
(1) $\frac{b}{a}$ (2) $\frac{a}{b}$ (3) ab (4) $\frac{a+b}{a-b}$

16. The value of $\sqrt{3}$ cosec 20°– sec20° is
(1) 2 (2) 1 (3) 4 (4) – 4

17. If sinA = 3sin(A+2B), then tan(A+B) is equal to
(1) – 2cosB (2) – 2tanB (3) cot B (4) – 2

18. If tanθ = $-\frac{4}{3}$, then the value of sinθ is
(1) $-\frac{4}{5}$ but ≠ $\frac{4}{5}$ (2) $\frac{-4}{5}$ or $\frac{4}{5}$ (3) $\frac{4}{5}$ but ≠ $-\frac{4}{5}$ (4) $\frac{1}{5}$

19. The value of $\frac{\tan 70° - \tan 20°}{\tan 50°}$ is equal to
(1) 2 (2) 1 (3) 0 (4) 3

20. $\frac{3\cos\theta+\cos3\theta}{3\sin\theta-\sin3\theta}$ is equal to

(1) $1+\cot^2\theta$ (2) $\cot^4\theta$ (3) $\cot^3\theta$ (4) $2\cot\theta$

21. The value of $\sin10°+\sin20°+\sin30°+...+\sin360°$ is equal to

(1) 0 (2) 1 (3) $\sqrt{3}$ (4) 2

22. If $\sin\theta+\text{cosec}\theta=2$ then $\sin^n\theta+\text{cosec}^n\theta$ is equal to

(1) 2 (2) 2^n (3) 2^{n-1} (4)

23. If $\sin\theta=\frac{1}{3}$, then the quadratic equation whose roots are $\tan\frac{\theta}{2}$ and $\cot\frac{\theta}{2}$ is

(1) $x^2-6x+1=0$ (2) $x^2+6x+1=0$ (3) $x^2-6x-1=0$ (4) $x^2+6x-1=0$

24. If in a Δ ABC, $\tan A+\tan B+\tan C=6$ then the value of $\cot A\cdot\cot B\cdot\cot C$ is equal to.

(1) 6 (2) 1 (3) $\frac{1}{6}$ (4) 3

25. General solution of $\tan5\theta=\cot2\theta$ is

(1) $\theta=\frac{n\pi}{7}+\frac{\pi}{14}$ (2) $\frac{n\pi}{7}+\frac{\pi}{5}$ (3) $\frac{n\pi}{7}+\frac{\pi}{2}$ (4) $\frac{n\pi}{7}+\frac{\pi}{3}$

26. Value of $\cos\frac{\pi}{33}\cos\frac{2\pi}{33}\cos\frac{4\pi}{33}\cos\frac{8\pi}{33}\cos\frac{16\pi}{33}$

(1) $\frac{1}{16}$ (2) $\frac{1}{32}$ (3) $\frac{1}{64}$ (4) $-\frac{1}{16}$

27. Total number of solution of $16^{\sin^2 x}+16^{\cos^2 x}=10$ in $x\in[0,3\pi]$, is equal to

(1) 4 (2) 8 (3) 12 (4) 10

28. Range of value of $13+12\sin\frac{11\theta}{2}+5\cos\frac{11\theta}{2}$ is

(1) [0,26] (2) (0,26) (3) [–13,13] (4) [13, 26]

29. If $\alpha+\beta+\gamma=2\pi$, then

(1) $\tan\frac{\alpha}{2}+\tan\frac{\beta}{2}+\tan\frac{\gamma}{2}=\tan\frac{\alpha}{2}\tan\frac{\beta}{2}\tan\frac{\gamma}{2}$ (2) $\tan\frac{\alpha}{2}+\tan\frac{\beta}{2}+\tan\frac{\beta}{2}\tan\frac{\gamma}{2}+\tan\frac{\gamma}{2}\tan\frac{\alpha}{2}=1$

(3) $\tan\frac{\alpha}{2}+\tan\frac{\beta}{2}+\tan\frac{\gamma}{2}=-\tan\frac{\alpha}{2}\tan\frac{\beta}{2}\tan\frac{\gamma}{2}$ (4) none of these

30. If $\tan\theta+\sec\theta=e^x$, then $\cos\theta$ equals

(1) $\frac{e^x+e^{-x}}{2}$ (2) $\frac{2}{e^x+e^{-x}}$ (3) $\frac{e^x-e^{-x}}{2}$ (4) $\frac{e^x-e^{-x}}{e^x+e^{-x}}$

Practice Test (JEE-Main Pattern)

OBJECTIVE RESPONSE SHEET (ORS)

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

PART - II : PRACTICE QUESTIONS

1. If $\sin\alpha \sin\beta - \cos\alpha \cos\beta + 1 = 0$, then the value of $1 + \cot\alpha \tan\beta$ is
(1) 1 (2) – 1 (3) 2 (4) 0

2. In a triangle ABC, angle A is greater than angle B. If the measures of angles A and B satisfy the equation $3 \sin x - 4 \sin^3 x - k = 0$, $0 < k < 1$, then the measure of angle C is :
(1) $\frac{\pi}{3}$ (2) $\frac{\pi}{2}$ (3) $\frac{2\pi}{3}$ (4) $\frac{5\pi}{6}$

3. The positive integral value of $n > 3$ satisfying the equation
$$\frac{1}{\sin\left(\frac{\pi}{n}\right)} = \frac{1}{\sin\left(\frac{2\pi}{n}\right)} + \frac{1}{\sin\left(\frac{3\pi}{n}\right)}$$ is
(1) 5 (2) 6 (3) 7 (4) 8

4. For $0 < \theta < \frac{\pi}{2}$, the solution(s) of $\sum_{m=1}^{6} \operatorname{cosec}\left(\theta + \frac{(m-1)\pi}{4}\right) \operatorname{cosec}\left(\theta + \frac{m\pi}{4}\right) = 4\sqrt{2}$ is(are)
(1) $\frac{\pi}{4}$ (2) $\frac{\pi}{6}$ (3) $\frac{\pi}{3}$ (4) $\frac{5\pi}{12}$

5. $\cos(\alpha - \beta) = 1$ and $\cos(\alpha + \beta) = \frac{1}{e}$, where $\alpha, \beta \in [-\pi, \pi]$. Number of pairs (α, β) which satisfy both the equations is/are
(1) 0 (2) 1 (3) 2 (4) 4

6. Let $\theta, \varphi \in [0, 2\pi]$ be such that $2\cos\theta(1 - \sin\varphi) = \sin^2\theta \left(\tan\frac{\theta}{2} + \cot\frac{\theta}{2}\right) \cos\varphi - 1$, $\tan(2\pi - \theta) > 0$ and $1 < \sin\theta < -\frac{\sqrt{3}}{2}$. Then value of φ is
(1) $0 < \varphi < \frac{\pi}{2}$ (2) $\frac{\pi}{2} < \varphi < \frac{4\pi}{3}$ (3) $\frac{4\pi}{3} < \varphi < \frac{3\pi}{2}$ (4) $\frac{3\pi}{2} < \varphi < 2\pi$

7. The number of all possible triplets (a_1, a_2, a_3) such that : $a_1 + a_2 \cos 2x + a_3 \sin^2 x = 0$ for all x is
(1) 0 (2) 1 (3) 2 (4) infinite

8. For $x \in (0, \pi)$, the equation $\sin x + 2 \sin 2x - \sin 3x = 3$ has
(1) infinitely many solutions (2) three solutions
(3) one solution (4) no solution

9. Number of ordered pairs (a, x) satisfying the equation $\sec^2(a + 2)x + a^2 - 1 = 0$ where $a \in R$ and $-\pi < x < \pi$ is

(1) 2` (2) 1 (3) 3 (4) Infinite

10. Number of solution of the equation $x = 4 \sin x$ when $x \in [0, 2\pi]$ is
(1) 1 (2) 2 (3) 3 (4) 4

11. The number of integral values of a for which the equation $\cos 2x + a \sin x = 2a - 7$ possesses a solution is
(1) 2 (2) 3 (3) 4 (4) 5

12. The equation $\sin^6 x + \cos^6 x = a^2$ has real solution if
(1) $a \in (-1, 1)$ (2) $a \in \left[-1, -\frac{1}{2}\right] \cup \left[\frac{1}{2}, 1\right]$ (3) $a \in \left(-\frac{1}{2}, \frac{1}{2}\right)$ (4) $a \in (-2, 2)$

13. If the area of circle is A_1 and area of regular pentagon inscribed in the circle is A_2, then the ratio of area of two is
(1) $\frac{2\pi}{5}\sec\left(\frac{\pi}{10}\right)$ (2) $\frac{\pi}{5}\sec\left(\frac{\pi}{10}\right)$ (3) $\frac{\pi}{10}\sec\left(\frac{\pi}{10}\right)$ (4) $\frac{\pi}{10}\sec\left(\frac{\pi}{5}\right)$

14. A regular pentagon and a regular decagon have the same perimeter, the ratio of their areas is
(1) $3 : \sqrt{5}$ (2) $1 : \sqrt{5}$ (3) $2 : \sqrt{5}$ (4) $2 : \sqrt{5}$

15. General solution of equation $1 + 2 \operatorname{cosec} x = -\frac{\sec^2 \frac{x}{2}}{2}$ is
(1) $n\pi, n \in I$ (2) $2n\pi, n \in I$ (3) $2n\pi - \frac{\pi}{2}, n \in I$ (4) $2n\pi + \frac{\pi}{2}, n \in I$

16. The number of distinct solutions of the equation
$\frac{5}{4}\cos^2 2x + \cos^4 x + \sin^4 x + \cos^6 x + \sin^6 x = 2$ in the interval $[0, 2\pi]$ is
(1) 8 (2) 4 (3) 6 (4) 2

17. All solutions of the equation $2 \sin\theta + \tan\theta = 0$ are obtained by taking all integral values of m and n in:
(1) $2n\pi + \frac{2\pi}{3}, n \in I$ (2) $n\pi$ or $2m\pi \pm \frac{2\pi}{3}$ where $n, m \in I$
(3) $n\pi$ or $m\pi \pm \frac{\pi}{3}$ where $n, m \in I$ (4) $n\pi$ or $2m\pi \pm \frac{\pi}{3}$ where $n, m \in I$

18. Total number of solutions of equation $\sin x \cdot \tan 4x = \cos x$ belonging to $(-\pi, 2\pi)$ are :
(1) 4 (2) 7 (3) 8 (4) 15

19*. The general value of θ satisfying the equation $2\cos 2\theta + \sqrt{2\sin\theta} = 2$ is –
(1) $n\pi, n \in I$ (2) $n\pi + (-1)^n \frac{\pi}{3}, n \in I$
(3) $n\pi + (-1)^n \frac{\pi}{6}, n \in I$ (4) $n\pi + (-1)^n \frac{\pi}{4}, n \in I$

20*. General solution of the equation $\frac{\sqrt{3}}{2} \sin x - \cos x = \cos 2x$ is :
(1) $x = (2n + 1)\pi, n \in I$ (2) $x = 2n\pi \pm \frac{\pi}{3}, n \in I$
(3) $x = 2n\pi \pm \frac{\pi}{4}, n \in I$ (4) $x = 2n\pi \pm \frac{\pi}{6}, n \in I$

APSP Answers

Trigonometry

PART - I

1.	(2)	**2.**	(3)	**3.**	(3)	**4.**	(2)	**5.**	(2)	**6.**	(1)	**7.**	(4)
8.	(3)	**9.**	(3)	**10.**	(3)	**11.**	(1)	**12.**	(4)	**13.**	(1)	**14.**	(2)
15.	(2)	**16.**	(3)	**17.**	(2)	**18.**	(2)	**19.**	(2)	**20.**	(3)	**21.**	(1)
22.	(1)	**23.**	(1)	**24.**	(3)	**25.**	(1)	**26.**	(2)	**27.**	(3)	**28.**	(1)
29.	(1)	**30.**	(2)										

PART - II

1.	(4)	**2.**	(3)	**3.**	(3)	**4.**	(4)	**5.**	(4)	**6.**	(2)	**7.**	(4)
8.	(4)	**9.**	(3)	**10.**	(2)	**11.**	(4)	**12.**	(2)	**13.**	(1)	**14.**	(4)
15.	(3)	**16.**	(1)	**17.**	(2)	**18.**	(4)	**19.**	(1)	**20*.**	(1, 2)		

g