

APEEJAY SCHOOL COMMON ANNUAL EXAMINATION -2021-22
SUBJECT – MATHEMATICS (041), CLASS – XI

TIME – 2 Hours.

M.M. – 40

<p>General Instructions :</p> <p>All questions are compulsory</p> <p>(i) This question paper contains three sections A, B and C. Each part is compulsory.</p> <p>(ii) Section A has 6 short answer type question of 2 marks each.</p> <p>(iii) Section B has 4 short answer type question of 3 marks each.</p> <p>(iv) Section C has 4 long answer type question of 4 marks each.</p>		
Section A		
1.	Find the angle in radians through which a pendulum swings if its length is 75 cm and the tip describes an arc of length (i) 10 cm (ii) 15 cm	2
2.	Prove that : $\cos 24^\circ + \cos 55^\circ + \cos 125^\circ + \cos 204^\circ + \cos 300^\circ = \frac{1}{2}.$	2
3.	Solve the following inequation : $5x - 1 > 3x + 7.$ Show the graph of the solution on the number line.	2
4.	If ${}^{10}P_r = 5040$, find the value of r.	2
5.	Find the equation of the ellipse whose foci are $(\pm 5, 0)$ and eccentricity $5/8$.	2
6.	Find the probability of getting the sum as a prime number when two dice are thrown together.	2
Section B		
7.	Find the number of arrangements of the letters of the word INDEPENDENCE, In how many of these arrangements (i) do the words start with P? (ii) do all the vowels always occur together ? (iii) do the words begin with I and end in P?	3
8.	Differentiate $\sin^2 x$ from first principles.	3
9.	Differentiate $(x \sin x + \cos x)(x \cos x - \sin x)$ w.r.t. x.	3
10.	If one end of the diameter of the circle $x^2 + y^2 - 8x - 4y + c = 0$ is $(-3, 2)$, find the other end of the diameter.	3
Section C		
11.	If $\tan x = \frac{3}{4}$, $\pi < x < \frac{3\pi}{2}$, find the values of $\sin \frac{x}{2}$, $\cos \frac{x}{2}$ and $\tan \frac{x}{2}$.	4
12.	A manufacturer has 600 litres of a 12% solution of acid. How many litres of a 30% acid solution must be added to it so that acid content in the resulting mixture will be more than 15% but less than 18% ?	4

13.	If the origin is the centroid of the triangle PQR with vertices P(2a, 2, 6), Q(- 4, 3b, - 10) and R(8, 14, 2c), then find the value of a, b and c.	4
14.	A pack of 50 tickets numbered 1 to 50 is shuffled and two tickets are drawn. Find the probability that (i) both the tickets drawn bear prime numbers. (ii) neither of the tickets drawn bear a prime numbers.	4