

# APEEJAY SCHOOL PANCHSHEEL PARK

### Class XI

# Subject- Mathematics

## MIDTERM EXAMINATION (2024-25)

Name of the				M.M. 80_
General In	the second secon			
ii. S iii. S iv. S v. S vi. A	ection A has 20 question B has 5 question C has 6 question ection D has 4 question E has 3 case-ball Questions are comporaw neat figures when	ns carrying 02 marks ns carrying 03 marks ons carrying 05 marks used questions (04 mar oulsory	each.	ts.
		SECTION A (1 ×	20)	
	value of $\left(\frac{2}{1+i}\right)^2$ is a) $-2i$	b) 2	c) -4 <i>i</i>	d) 2i
2. The	minute hand of a wat	ch is 3cm long. How	far does its tip move	in 20 minutes
2 77	a) 12.56 cm value of $\sin\left(-\frac{41\pi}{3}\right)$	b) 3.14 cm is	c) 9.56 cm	d) 6.28 cm
	a) $\frac{\sqrt{3}}{2}$	b) $-\frac{1}{2}$	c) $-\frac{\sqrt{3}}{2}$	$-d) \frac{1}{2}$
4. The	solution of inequalit	ies 3x - 7 > 2(x - 6)	6) and $6 - x > 11 -$	2x is
	(a) $x > 5$	b) $x > -5$	c) $-5 < x < 5$	d) $x < -5$ x > 5
5. The	imaginary part of th	e complex number i9	$+i^{19}+i^{29}$ is	d) -i

6. The set of real x satisfying the inequality  $\frac{5-2x}{3} \le \frac{x}{6} - 5$  is

b) -1

a) (8,∞)

a) 0

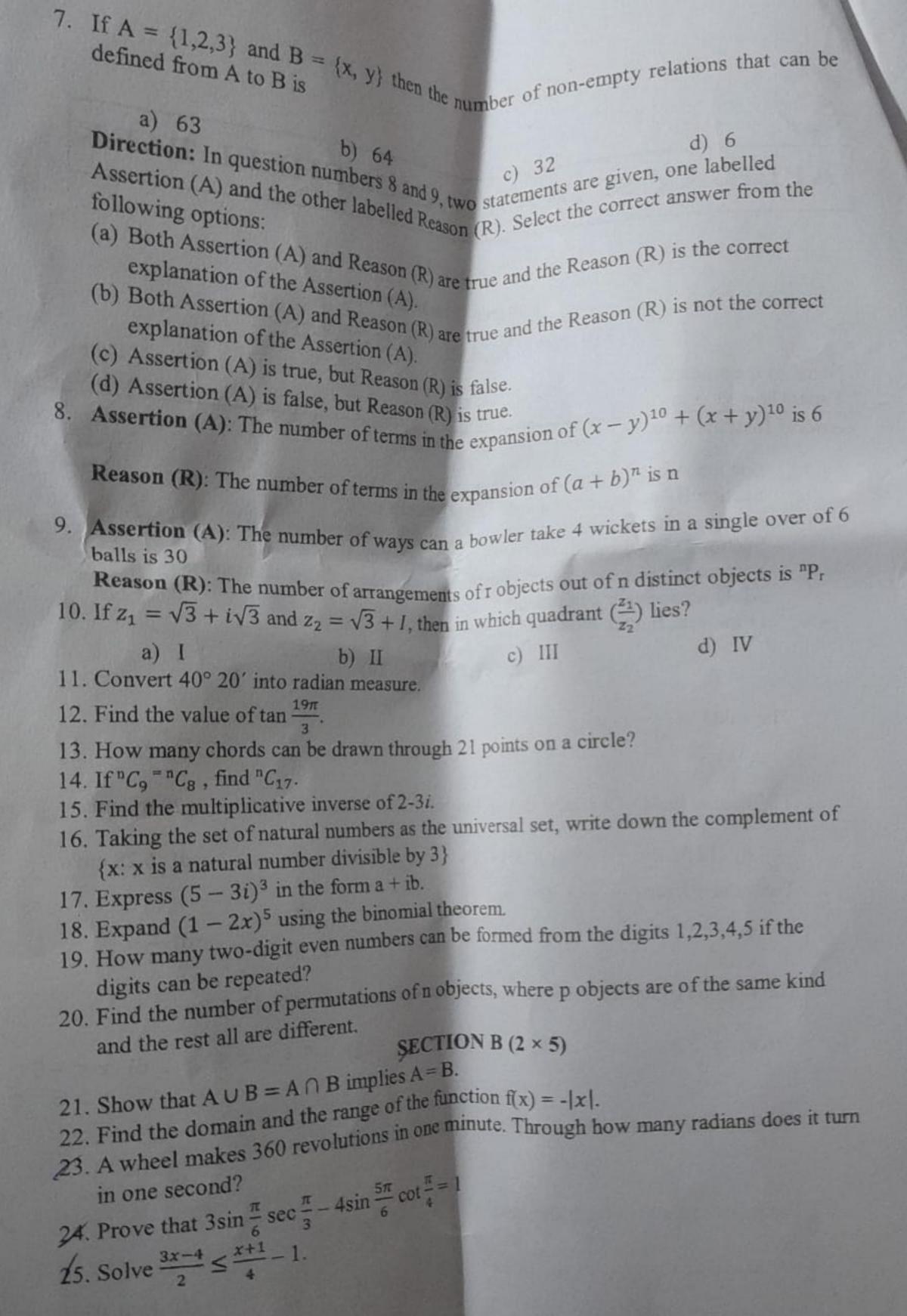
·b) [8,∞)

c) (-∞,8)

·c) i

d) [-8,6)

d) -i



SECTION C (3 × 6)

- 26. How many litres of water will have to be added to 1125 litres of the 45% solution of acid so that the resulting mixture will contain more than 25% but less than 30% acid
- Prove that  $\cos 2x \cos \frac{x}{2} \cos 3x \cos \frac{9x}{2} = \sin 5x \sin \frac{5x}{2}$ .

28. Find the number of non-zero integral solutions of the equation  $|1-i|^x = 2^x$ .

29. Prove that  $\cos 6x = 32 \cos^6 x - 48 \cos^4 x + 18 \cos^2 x - 1$ 

30) Let A and B be sets. If  $A \cap X = B \cap X = \emptyset$  and  $A \cup X = B \cup X$  for some set X, show that A = B.

31) Find the value of  $\tan \frac{\pi}{8}$ .

× SECTION D (5 × 4)

32) If  $\tan x = \frac{3}{4}$ ,  $\pi < x < \frac{3\pi}{2}$ , find the value of  $\sin \frac{x}{2}$ ,  $\cos \frac{x}{2}$  and  $\tan \frac{x}{2}$ .

33. A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has (i) no girl (ii) at least one boy and one girl (iii) at least 3 girls? 34. Evaluate

a) 
$$(\sqrt{3} + \sqrt{2})^6 - (\sqrt{3} - \sqrt{2})^6$$

b)  $(a^2 + \sqrt{a^2 - 1})^4 + (a^2 - \sqrt{a^2 - 1})^4$ 

Find the value(s) of  $\theta$  for which the complex number  $\frac{1+i\cos\theta}{1-2i\cos\theta}$  is purely real.

#### SECTION E (4 × 3)

36. Rani is playing with scramble word cubes. She needs to form words using all the letters of the word 'ORGANIC' without repetition of letters.



In how many of these words:

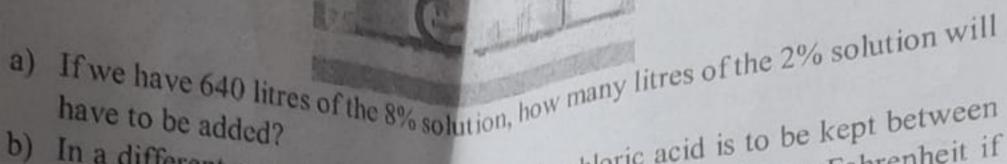
Vowels and consonants are alternate with each other

All vowels are together

Vowels and consonants occur together

Words begin with a vowel

37. In an experiment, a solution of 8% boric acid is to be diluted by adding a 2% boric acid solution to it. The resulting mixture is to be more than 4% but less than 6% boric acid.



b) In a different experiment a solution of hydrochloric acid is to be kept between 30° and 35° Celsius. What is the range of temperature in degree Fahrenheit if the conversion formula is given by  $C = \frac{5}{9}(F - 32)$ , where C and F represent temperature in degree Fahrenheit is the range of temperature in degree Fahrenheit.

temperature in degree Celsius and degree Fahrenheit, respectively.

38. A committee wants to select a cricket team of eleven players from 17 players in which only 5 players can bowl.



- a) In how many ways this can be done if each cricket team of 11 includes exactly 4 bowlers?
- b) If a support team of 3 persons is to be constituted from a group of 2 men and 3 women. In how many ways can this be done? How many of these teams would consist of 1 man and 2 women?