

TIME ALLOWED: 3 HOURS

**General Instructions:**

- This Question paper contains - five sections A, B, C, D and E. Each section is compulsory. However, there are internal choices in some questions.
- Section A has 18 MCQ's and 02 Assertion-Reason based questions of 1 mark each.
- Section B has 5 Very Short Answer (VSA)-type questions of 2 marks each.
- Section C has 6 Short Answer (SA)-type questions of 3 marks each.
- Section D has 4 Long Answer (LA)-type questions of 5 marks each.
- Section E has 3 source based/case based/passage based/integrated units of assessment of 4 marks each with sub-parts.

**SECTION - A**  
(All questions are compulsory. No internal choice is provided in this section)

1

Q1 Evaluate  $\tan\left(\frac{-16\pi}{3}\right)$ 

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

Q2 Two finite sets have  $m$  and  $n$  elements respectively. The total number of subsets of first set is 56 more than the total number of subsets of the second set. The values of  $m$  and  $n$  respectively are

- (a) 7, 6 (b) 5, 1 (c) 6, 3 (d) 8, 7

Q3 The extreme values of  $\sin\theta$  are

- (a) 0 and 1 (b) -1 and 0 (c) -1 and 1 (d)  $\frac{-\sqrt{3}}{2}$  and  $\frac{1}{\sqrt{2}}$

Q4 If  $A = \{1, 2, 4\}$ ,  $B = \{2, 4, 5\}$ ,  $C = \{2, 5\}$  then  $(A - B) \times (B - C)$  is

- (a)  $\{(1, 2), (1, 5), (2, 5)\}$  (b)  $\{(1, 4)\}$  (c)  $\{(1, 4), (4, 4)\}$  (d)  $\{(4, 1), (4, 4)\}$

Q5 In a GP if the  $(m + n)^{th}$  term is  $p$  and  $(m - n)^{th}$  term is  $q$ , then its  $(m)^{th}$  term is

- (a) 0 (b)  $pq$  (c)  $\sqrt{pq}$  (d)  $\frac{1}{2}(p + q)$

Q6  $\frac{\cos(90^\circ + \theta)\sec(270^\circ + \theta)\sin(180^\circ + \theta)}{\operatorname{cosec}(-\theta)\cos(270^\circ - \theta)\tan(180^\circ + \theta)} = ?$

- (a)  $\cos\theta$  (b)  $\sec\theta$  (c)  $\cot\theta$  (d) none of these

- Q7 If A and B are two given sets, then  $A \cap (A \cap B)^c$  is equal to  
 (a) A (b) B' (c)  $\emptyset$  (d)  $A - B$
- Q8 The value of  $(1 + i)^4 + (1 - i)^4$  is  
 (a) 8 (b) 4 (c) -8 (d) -4
- Q9 What is the value of n, if  $P(15, n - 1) : P(16, n - 2) = 3 : 4$ .  
 (a) 10 (b) 12 (c) 14 (d) 15
- Q10  $\sin 105^\circ + \cos 105^\circ$  is  
 (a)  $\sqrt{2}$  (b)  $\frac{1}{\sqrt{2}}$  (c)  $\frac{1}{\sqrt{3}}$  (d)  $\frac{2}{\sqrt{3}}$
- Q11 What is the number of signals that can be sent by 6 flags of different colours taking one or more at a time?  
 (a) 21 (b) 6 (c) 720 (d) 1956
- Q12 If the arithmetic and geometric means of two numbers are 10 and 8 respectively, then one number exceeds the other number by  
 (a) 8 (b) 10 (c) 12 (d) 16
- Q13 If  $A = \{1, 2, 3, 4\}$ , then number of proper subsets of A is  
 (a) 16 (b) 15 (c) 14 (d) 10
- Q14 Let  $A = \{1, 2, 3\}$ ,  $B = \{1, 4, 6, 9\}$ , if relation R from A to B defined by x is greater than y. The range of R is  
 (a)  $\{1, 4, 6, 9\}$  (b)  $\{4, 6, 9\}$  (c)  $\{1\}$  (d) None of these
- Q15 If  $\sec x = -2$  and  $\pi < x < \frac{3\pi}{2}$ , then  $\sin x$  is  
 (a)  $\frac{\sqrt{3}}{2}$  (b)  $-\frac{\sqrt{3}}{2}$  (c)  $\frac{1}{2}$  (d)  $-\frac{1}{2}$
- Q16 If  $z = \frac{1}{1 - \cos\theta - i\sin\theta}$ , then  $\operatorname{Re}(z)$  is  
 (a) 0 (b)  $\frac{1}{2}$  (c)  $\cot \frac{\theta}{2}$  (d)  $\frac{1}{2} \cot \frac{\theta}{2}$
- Q17 If  $\frac{z-3}{z-2} > 0$  then x belongs to  
 (a)  $(-\infty, 3) \cup (5, \infty)$  (b)  $(-\infty, -3) \cup (-5, \infty)$  (c)  $(-\infty, 3] \cup [5, \infty)$  (d)  $(3, 5)$
- Q18 The value of  $2 \sin \frac{5\pi}{12} \sin \frac{\pi}{12}$  is  
 (a)  $\frac{1}{\sqrt{2}}$  (b)  $\sqrt{2}$  (c)  $\frac{1}{2}$  (d)  $\frac{\sqrt{3}}{2}$

Questions number 19 and 20 are Assertion and Reason based questions carrying 1 mark each. Two statements are given, one labelled Assertion (A) and the other labelled Reason (R).

REDMI NOTE 8  
 Select the correct answer from the codes (a), (b), (c) and (d) as given below.  
 AI QUAD CAMERA  
 (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

- (b) Both Assertion (A) and Reason (R) are true and Reason (R) is not the correct explanation of the Assertion (A).  
 (c) Assertion (A) is true, but Reason (R) is false.  
 (d) Assertion (A) is false, but Reason (R) is true.

Q19 Assertion: A number of four different digits is formed with the help of the digits 1, 2, 3, 4, 5, 6, 7 in all possible ways. Then, number of numbers exactly divisible by 4 is 200.  
 Reason: A number divisible by 4, if unit digit is divisible by 4

Q20 Suppose A, B and C are three arbitrary sets and U is a universal set  
 Assertion: If  $B = U - A$ , then  $n(B) = n(U) - n(A)$   
 Reason: If  $C = A - B$ , then  $n(C) = n(A) - n(B)$

**SECTION - B**  
 (All questions are compulsory. In case of internal choice, attempt any one question only)

- Q21 Write an example of three sets A, B, C such that  $A \cap B = A \cap C$  but  $B \neq C$  2  
 Q22 Solve  $|4 - x| < 2$  2  
 Q23 Find the value of  $\operatorname{cosec}(-1410^\circ)$  2

OR

Evaluate  $\sin \frac{\pi}{12}$   
 Q24 If  $P(n, r) = P(n, r+1)$  and  $C(n, r) = C(n, r-1)$ , find n and r. 2

Q25 Find the 8<sup>th</sup> term from the end of the GP 3, 6, 12, 24, ..., 12288

OR

Find four numbers in GP such that the third term is greater than the first by 9 and the second term is greater than the fourth by 18. 2

**SECTION - C**

(All questions are compulsory. In case of internal choice, attempt any one question only)

- Q26 How many words (with or without meaning) can be made from the letters of the word MONDAY, assuming that no letter is repeated, when:  
 (i) 4 letters are used at a time 3  
 (ii) all letters are used at a time  
 (iii) all letters are used but the first letter is a vowel 3

OR

In how many of the distinct permutations of the letters in MISSISSIPPI do the 4 I's not come together?

Q27 Evaluate  $\left\{ i^{23} + \left( \frac{1}{i} \right)^{29} \right\}^2$  3

Q28 If  $\tan x = \frac{-3}{4}$  and  $\frac{3\pi}{2} < x < 2\pi$ , find the values of  
 (i)  $\sin 2x$  (ii)  $\cos 2x$  (iii)  $\tan 2x$  3

OR

REDMI NOTE 8 - 2sin x



(OK)

Q29 Evaluate  $\cos\left(\frac{3\pi}{2} + \theta\right) \cos(2\pi + \theta) \left[\cot\left(\frac{3\pi}{2} - \theta\right) + \cot(2\pi + \theta)\right]$   
A manufacturer has 460 litres of a 9% acid solution. How many litres of a 3% acid solution must be added to it so that the acid content in the resulting mixture be more than 5% but less than 7%? 3

Q30 Reduce  $\left(\frac{1}{1+2i} + \frac{3}{1-i}\right) \left(\frac{3-2i}{1+3i}\right)$  to the form  $a + ib$   
Find the complex number  $z$  for which  $|z + 1| = z + 2(1 + i)$  3

Q31 In a group of 52 persons, 16 drink tea but not coffee and 33 drink tea. Find  
(i) How many drink tea and coffee both  
(ii) How many drink coffee but not tea. 3

**SECTION - D**  
**(All questions are compulsory. In case of internal choice, attempt any one question only)**

Q32 Find the domain and range of the real function,  $f(x) = \frac{1}{\sqrt{x+|x|}}$  5

OR

Find the domain and range of the real function,  $f = \left\{ \left(x, \frac{x^2}{x^2+1}\right) : x \in R \right\}$  from R into R. 5

Q33 Each side of an equilateral triangle is 18 cm. The midpoints of its sides are joined to form another triangle whose midpoints, in turn, are joined to form still another triangle. The process is continued indefinitely. Find the sum of the (i) perimeters of all the triangles and (ii) areas of all the triangles. 5

OR

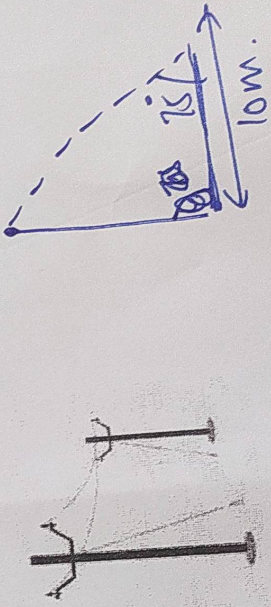
Q34 Find three numbers in GP whose sum is 13 and the sum of whose squares is 91. 5

Q35 Prove that  $\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ = \frac{1}{16}$   
The sum of two numbers is 6 times their geometric mean. Show that the numbers are in the ratio  $(3 + 2\sqrt{2}) : (3 - 2\sqrt{2})$  5

**SECTION - E**  
**CASE BASED QUESTIONS**

**(All questions are compulsory. In case of internal choice, attempt any one question only)**

Q36 While playing with this nephew Shashank, Mr. V.S. Malik observes a vertical pole in park. A wire is tied from top of pole to a point on ground level. Mr. Malik asks Shashank some mathematics related questions. Mr. Shashank is Class-XI student and very intelligent in Maths. Using some tools he measure the distance of point at ground where wire is tied as 10 m. and angle between wire and ground level as  $75^\circ$ .



1

What is the value of  $\tan 75^\circ$  ?

1

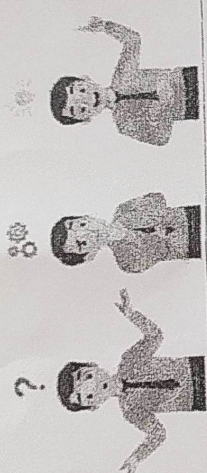
What is the value of  $\sin 105^\circ$  ?

2

What is the height of pole?

While solving a typical equation a person finds that one of the root of the equation is a complex

number  $z = \frac{1+2i}{1-3i}$  help him to find



1

The standard form of  $z$

1

The modulus of  $z$

2

Conjugate of  $Z$

Q38

A Company wants to appoint 5 persons, 3 for post A and 2 for post B for its upcoming office in Delhi. They have invited the applications for the same. 14 candidates have applied for the post A and 13 have applied for the post B



i

Find the total number of ways in which the company can make a selection for all the posts.

ii

Find the number of ways of selecting one woman for each post, if 3 women have applied for post A and 7 women have applied for post B

iii

While checking the applications the management observed that one candidate each who have applied for post A and B are not fit for the job. So they cannot be appointed. In how many ways can now the post is filled?

