

Pune Vidyarthi Griha's
Muktangan English School & Jr. College, Pune - 9
Terminal Examination (2024-25)
Standard - XI

Subject - MATHEMATICS
Date - 22-10-2024

Marks - 50
Time - 09.00 a.m. to 11.30 a.m.

General Instructions :

The question paper is divided into four sections.

- 1) Section A : Q. No. 1 contains five multiple choice type questions carrying two mark each. Q. 2 contains four very short answer type questions carrying one mark each.
- 2) Section B : Q. No. 3 to Q. No. 13 are eleven very short answer type of questions carrying two marks each. (Attempt any eight)
- 3) Section C : Q. No. 14 to Q. No.19 are six short answer type of questions carrying Three marks each. (Attempt any four)
- 4) Section D : Q. No. 20 to Q. No. 23 are four long answer type of questions carrying four marks each. (Attempt any two)
- 5) Figures to the right indicate full marks.
- 6) For each multiple choice of questions, only the first attempt will be considered for evaluation.

SECTION - 'A'

- (I) **Select the correct option from the given alternatives. (2 marks each) [10]**
- (i) The value of expression $\cos 1^\circ \cos 2^\circ \cos 3^\circ \dots \cos 179^\circ = \dots$
(a) -1 (b) 0 (c) $\frac{1}{\sqrt{2}}$ (d) 1
- (ii) $\left(\frac{22\pi}{15}\right)^c$ is equal to
(a) 246° (b) 264° (c) 224° (d) 426°
- (iii) If $\omega \neq 1$ is a cuberoot of unity and $(1 + \omega)^7 = A + B\omega$, then A and B are respectively the numbers
(a) 0,1 (b) 1,1 (c) 1,0 (d) -1,1
- (iv) The common ratio of the G.P. is 5, 5th term is 1875, the first term is
(a) 3 (b) 5 (c) 15 (d) -5
- (v) The number of ways the letters of the word HISTORY can be arranged as Y and T are always together :
(a) 7! (b) 6! (c) $6! \times 2!$ (d) $5! \times 2!$

Q.2 Answer the following questions : (1 mark each)

[4]

- (i) Determine whether the given pair of angles is co-terminal or not :- $860^\circ, 580^\circ$
(ii) Find the value of $\sin 600^\circ$
(iii) Find the value of ${}^{10}C_7$
(iv) Verify whether the given sequence is H.P., $\frac{1}{3}, \frac{1}{6}, \frac{1}{12}, \frac{1}{24}, \dots$

SECTION - 'B'

Attempt any eight of the following questions : (2 Marks each)

[16]

- Q.3 Find the angle between hour hand and minute hand in a clock at 2:20.
Q.4 If $\tan A = 5/6, \tan B = 1/11$, prove that $A + B = \pi/4$.
Q.5 Express as the sum or difference of two trigonometric function : $2 \sin 4x \cos 2x$
Q.6 Find the value of $\cos 75^\circ$, using appropriate formula.
Q.7 Use De Moivers theorem and simplify. $\frac{(\cos 5\theta + i \sin 5\theta)^2}{(\cos 4\theta - i \sin 4\theta)^3}$
Q.8 Find the sum of infinite terms of the given G.P. if it exists - $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \dots$
Q.9 Find the number of permutations of the letters of the word CALCULATOR.
Q.10 Find n, if ${}^n P_6 : {}^n P_3 = 120 : 1$
Q.11 Find A.M., G.M. of the numbers 4 and 16.
Q.12 If $\operatorname{cosec} \theta + \cot \theta = 5/2$, then find the value of $\tan \theta$.
Q.13 Prove that $\cos 3\theta = 4\cos^3 \theta - 3\cos \theta$

SECTION - 'C' (Marks 12)

Attempt any four of the following questions. (3 marks each)

[12]

- Q.14 If $2\sin^2 \theta + 7\cos \theta = 5$, then find the permissible value of $\cos \theta$.
Q.15 Show that $\sqrt{\frac{1 + \sin 2A}{1 - \sin 2A}} = \tan \left(\frac{\pi}{4} + A \right)$

- Q.16 In a circle of radius 12 cms, an arc PQ subtends an angle of 30° at the centre. Find the area between the arc PQ and chord PQ.
- Q.17 Find the sum $5 + 55 + 555 + \dots$ upto n terms.
- Q.18 A committee of 10 members sits around a table. Find the number of arrangements that have a president and the vice-president together.
- Q.19 Find the value of $x^3 + x^2 - x + 22$ if $x = \frac{5}{1-2i}$

SECTION - 'D'

Attempt any two of the following (4 marks each)

[8]

- Q.20 Find the value of $\sec 150^\circ$, $\cot 150^\circ$, $\operatorname{cosec} 300^\circ$ and $\sin(-225^\circ)$
- Q.21 In $\triangle ABC$, prove that $\sin 2A + \sin 2B - \sin 2C = 4 \cos A \cdot \cos B \cdot \sin C$
- Q.22 For a G.P. if $t_2 = 7$, $t_4 = 1575$ find first term of the G.P.
- Q.23 Find the number of triangles formed by joining 12 points if
- no three points are collinear
 - four points are collinear

