

0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

2	3	4	7	2
0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

MRD-XI-17 (A)
MATHEMATICS – (Part-I)
 (Fresh / New Course)

Total Time: 3hrs

Total Marks: 100



MAT11C

Time: 20min

"SECTION – A"

Marks: 20

Q. 1 Choose the correct option i.e. A,B,C, and D.

- i. If $A^t = -A$ then such a matrix is called Matrix.
 - A Symmetric
 - B Skew symmetric
 - C Inverse
 - D Identity
- ii. A vector which joins a given point P in the plane or space with the origin is calledvector.
 - A Null
 - B Unite
 - C Position
 - D Normal
- iii. Two vectors a and b are said to beif they have the same magnitude and direction.
 - A Different
 - B Equal
 - C Unequal
 - D Parallel
- iv. $k \times j = \dots\dots\dots$
 - A k
 - B i
 - C j
 - D $-j$
- v. Volume of tetrahedron with a, b, c as its co-terminal edges is $V = \dots\dots\dots$
 - A $\frac{1}{6}(a \cdot (b \times c))$
 - B $\frac{1}{6}((a + b) \cdot c)$
 - C $\frac{1}{3}(a \cdot (b \times c))$
 - D Both a & b
- vi. The 15th term of the arithmetic sequence whose first three terms are 20, 16.5, and 13 is.....
 - A 29
 - B -29
 - C 30
 - D 28
- vii. Geometric mean between $-3/10$ and $-5/6$ is
 - A $1/4$
 - B $-1/2$
 - C $1/2$
 - D $-1/4$
- viii. If the third term of a geometric sequence is 27 and the fifth term is 243, then the value of r is.....
 - A 4
 - B 5
 - C ± 3
 - D 6
- ix. ${}^{10}P_4 = \dots\dots\dots$
 - A 540
 - B 5040
 - C 4050
 - D 450
- x. How many different words can be made out of the letters of the word "triangle"?
 - A 40000
 - B 40320
 - C 40500
 - D a & b
- xi. Domain of $f(x) = x - 1/x - 4$ is.....
 - A R
 - B $R - \{4\}$
 - C $R - \{1\}$
 - D $R - \{0\}$
- xii. $\sin \beta = \dots\dots\dots$
 - A $\sin(\pi - \beta)$
 - B $\sin(\pi + \beta)$
 - C $\cos(\pi - \beta)$
 - D $\cos(\pi + \beta)$
- xiii. The distance between the points A (1, 6), B (3, 8) is.....
 - A $2\sqrt{2}$
 - B 2
 - C 4
 - D 8
- xiv. $\cos(\pi/2) = \dots\dots\dots$
 - A -1
 - B 1
 - C 0
 - D 2
- xv. If none of the angle of a triangle is right angle, the triangle is called
 - A Acute
 - B Obtuse
 - C Isosceles
 - D Oblique
- xvi. The area of a triangle having sides of 43ft, 89ft, and 120ft is.....
 - A 1500
 - B 1523.70
 - C 1525
 - D 1550
- xvii. A complex number $c + di$ is called the multiplicative inverse of $a + bi$ complex no. if $(a + bi)(c + di) = \dots\dots\dots$
 - A 1
 - B 0
 - C $a + bi$
 - D $1 + 0i$
- xviii. Factorization of $Z^2 + 4$ is
 - A $(Z+2)(Z-2)$
 - B $(Z+2i)(Z-2i)$
 - C $(Z+2i)(Z-2i)$
 - D $(Z+2)(Z-2i)$
- xix. A matrix all whose elements are zero is called amatrix.
 - A Scalar
 - B Square
 - C Zero
 - D Symmetric
- xx. Transpose of a columns matrix is Matrix.
 - A Row
 - B Square
 - C Identity
 - D Column

MRD-XI-17(A)
MATHEMATICS - (Part-I)
 (Fresh / New Course)

P-306

Time Allowed: 2:40 Hrs

Section – B & C
“Section – B”

Total Marks: 80

Marks: 50

Q. 2 Write short answer of any TEN of the following parts. Each part carries equal marks.

- (i) Show that for all complex numbers z_1 and z_2 , $|z_1 z_2| = |z_1| |z_2|$
- (ii) Show that
$$\begin{vmatrix} a & b & c \\ l & m & n \\ x & y & z \end{vmatrix} = \begin{vmatrix} a & l & x \\ b & m & y \\ c & n & z \end{vmatrix}$$
- (iii) Find the terminal point of the vector $\vec{r} = i + 3j - 3k$ if the initial point is $(-2, 1, 4)$
- (iv) Insert four arithmetic means between 17 and 32.
- (v) The 2nd term of an H.P is $\frac{1}{2}$ and the fifth term is $-\frac{1}{4}$. Find the 12th term.
- (vi) Write in terms of factorial $\frac{n(n+1)(n+2)}{3}$
- (vii) A student figures that the probability of passing an algebra test is $\frac{8}{9}$. What is the probability of failing the test?
- (viii) Find the coefficient of x^9 in $\left(x + \frac{3a}{x^2}\right)^{15}$
- (ix) Given that $f(x) = x^3 - ax^2 + bx + 1$ if $f(2) = -3$ and $f(-1) = 0$. Find the values of a and b .
- (x) Show that $\sin(\alpha + \beta)\sin(\alpha - \beta) = \cos^2 \beta - \cos^2 \alpha$
- (xi) Prove that $\frac{\cos 5\theta + \cos 3\theta}{\sin 5\theta - \sin 3\theta} = \cot \theta$
- (xii) If a cone is 8.4cm high and has a vertical angle of 72° , calculate the diameter of its base.
- (xiii) Draw the graph of $y = \sin 2x$, $0 \leq x \leq 2\pi$

“Section – C”

Marks: 30

NOTE: Attempt any THREE questions. Each question carries equal marks.

Q. 3:

- a) Separate into real and imaginary parts $\left(\frac{1 + \sqrt{3}i}{1 - \sqrt{3}i}\right)^{-2}$
- b) Find a unite vector perpendicular to both $\vec{a} = i + j + 2k$ and $\vec{b} = -2i + j - 3k$

Q. 4:

- a) If $a_{10} = l$, $a_{13} = m$, $a_{16} = n$; show that $l_n = m^2$
- b) Prove by mathematical induction $\binom{3}{3} + \binom{4}{3} + \binom{5}{3} + \dots + \binom{n+2}{3} = \binom{n+3}{4}$

Q. 5:

- a) If $\sin \alpha = \frac{4}{5}$ and $\sin \beta = \frac{12}{13}$, and both α and β are measures of first quadrantal angles, then find $\cos(\alpha + \beta)$
- b) Solve the triangle for which length of three sides are $a=9$, $b=7$ and $c=5$

Q. 6:

- a) Find the rank of
$$\begin{bmatrix} 1 & 0 & -2 \\ 2 & 2 & 1 \\ -1 & 2 & 3 \end{bmatrix}$$
- b) Prove that $r \cdot C_r^n = n \cdot C_{r-1}^{n-1}$