

Jawahar Navodaya Vidyalaya Vechoochira Pathanamthitta
Assignment No-1 /2K18
MATHEMATICS (041)

Std: XI

Section A (1 mark each) (2×1m = 2m)

1. If $P \times Q = \{(a, q), (a, r), (b, q), (b, r)\}$ then find P and Q
2. Represent the set $A = \{2, 5, 10, 17, 26, 37\}$ in set-builder form.

Section B (2 marks each) (4×2m= 8m)

3. Show that the set of vowels in EDUCATION and the set of vowels in EQUATION are equal.
4. If $A \subset B$ then show that $C - B \subset C - A$ where C is any set.
5. If $n(A) = 3$ and $n(B) = 2$ then find the number of all possible relations from A to B.
6. The relations f and g are defined by $f(x) = \begin{cases} x^2, 0 \leq x \leq 4 \\ 4x, 4 \leq x \leq 12 \end{cases}$ and $g(x) = \begin{cases} x^2, 0 \leq x \leq 2 \\ 3x, 2 \leq x \leq 10 \end{cases}$.
Here f is a function and g is not a function. Explain the reasons.

Section C (4 marks each) (3×4m = 12m)

7. Represent in Venn diagram : $U = \{1, 2, 3, \dots, 10\}$ is the universal set of which $A = \{2, 4, 6, 8, 10\}$, $B = \{4, 6\}$ and $C = \{4, 8, 5\}$ are subsets
8. Define a relation R on the set N of natural numbers by $R = \{(x, y) : y = x + 3, x \text{ is a natural number less than } 5; x, y \in \mathbb{N}\}$. Depict this relationship using roster form. Write down the domain and the range.
9. Out of 500 car owners investigated, 400 owned car A and 200 owned car B, 50 owned both A and B cars. Is this data correct?

Section D (6 marks each) (3×6m = 18m)

10. State and prove De Morgan's Laws in Set Theory
11. In a survey of 400 students in a school, 100 were listed as taking apple juice, 150 as taking orange juice and 75 were listed as taking both apple as well as orange juice. Find how many students were taking neither apple juice nor orange juice
12. In a survey of 60 people, it was found that 25 people read newspaper H, 26 read newspaper T, 26 read newspaper I, 9 read both H and I, 11 read both H and T, 8 read both T and I, 3 read all three newspapers. Find: (i) the number of people who read at least one of the newspapers. (ii) the number of people who read exactly one newspaper.

Jawahar Navodaya Vidyalaya Vechoochira Pathanamthitta
Assignment No -2 /2K18
MATHEMATICS (041)

Std: XI

Section A (1 mark each) (2×1m = 2m)

1. Write the domain of the function $f(x) = \frac{7}{2-x}$; $x \neq 2$
2. Convert $40^{\circ}20'$ (40 degrees 20 minutes) into radian measure

Section B (2 marks each) (4×2m= 8m)

3. Find the value of $\sin 15^{\circ}$
4. Show that $\tan 3x \tan 2x \tan x = \tan 3x - \tan 2x - \tan x$
5. Prove that $\cos 4x = 1 - 8\sin^2 x \cos^2 x$
6. Show that $\tan(x+y) = \frac{\tan x + \tan y}{1 - \tan x \tan y}$

Section C (4 marks each) (3×4m = 12m)

7. Prove that :
$$\frac{\tan\left(\frac{\pi}{4} + x\right)}{\tan\left(\frac{\pi}{4} - x\right)} = \left(\frac{1 + \tan x}{1 - \tan x}\right)^2$$

8. For every positive integer n , prove that $7^n - 3^n$ is divisible by 4 using Mathematical Induction
9. Prove that $\sin 3x = 3\sin x - 4\sin^3 x$

Section D (6 marks each) (3×6 = 18)

10. Solve $\sin 2x - \sin 4x + \sin 6x = 0$.
11. Show that $1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{1}{6}n(n+1)(2n+1)$ using Mathematical Induction
12. Prove that $\cos(x+y) = \cos x \cos y - \sin x \sin y$

Jawahar Navodaya Vidyalaya Vechoochira Pathanamthitta
Assignment No-3 /2K18
MATHEMATICS (041)

Std: XI

Section A (1 mark each) (2×1m = 2m)

1. Express $(5i) \left(-\frac{3}{5}i\right)$ in the form $a + ib$
2. Find the value of ${}^{15}C_3 + {}^{15}C_{13}$.

Section B (2 marks each) (4×2m= 8m)

3. There are 5 different roads from city A to city B and 3 different roads from city B to city C. In how many ways can someone go from city A to city C passing by city B?
4. How many words can be made by using all letters of the word "MATHEMATICS" in which all vowels are never together?
5. Find the conjugate and multiplicative inverse of $2+3i$
6. Express $(-\sqrt{2} + \sqrt{-9})(3\sqrt{2} - i)$ in the form of $a+ib$

Section C (4 marks each) (3×4m = 12m)

7. Convert the complex number $1+i\sqrt{3}$ into polar form.
8. Find the real number x and y if $(x+iy)(3+5i)$ is the conjugate of $6 - 24i$.
9. Find the modulus and amplitude of the complex number $\frac{1-i}{1+i}$

Section D (6 marks each) (3×6 = 18)

10. If $a+ib = \frac{c+i}{c-i}$ where c is any real number, then prove that

$$a^2+b^2=1 \text{ and } \frac{b}{a} = \frac{2c}{c^2-1}.$$

11. Express the complex number $z = \frac{i-1}{\cos \frac{\pi}{3} + i \sin \frac{\pi}{3}}$ in the polar form.

12. Find the number of words with and without meaning which can be made using all the letters of the word MANJU. If these words are written as in a dictionary, what will be the 74th word?

Jawahar Navodaya Vidyalaya Vechoochira Pathanamthitta
Assignment No-4 /2K18
MATHEMATICS (041)

Std: XI

Section A (1 mark each) (2×1m = 2m)

1. For the sequence defined by $a_1 = 1, a_n = a_{n-1} + 2, \text{ for } n \geq 2$, find first five terms.
2. Find the x and y intercepts of the line $2x+3y=1$.

Section B (2 marks each) (4×2m= 8m)

3. If three points $(h,0)$, (a, b) and $(0,k)$ are collinear then show that $\frac{a}{h} + \frac{b}{k} = 1$
4. Find the equation of the line through $(-2, 3)$ with slope -4 .
5. Reduce the equation $3x + y - 8 = 0$ into normal form. Find the values of ρ and ω
6. Find the sum to n terms of the series $5+55+555+5555+\dots$

Section C (4 marks each) (3×4m = 12m)

7. Insert 6 numbers between 3 and 24 such that the resulting sequence is an A.P.
8. $P(a,b)$ is the mid point of a line segment between axes. Show that equation of the line is $\frac{x}{a} + \frac{y}{b} = 2$
9. If the p th, q th and r th terms of a G.P. are a, b and c , respectively. Prove that $a^{q-r} b^{r-p} c^{p-q} = 1$

Section D (6 marks each) (3×6 = 18)

10. The sum of n terms of two arithmetic progressions are in the ratio $(3n + 8) : (7n + 15)$. Find the ratio of their 12th terms.
11. The sum of two numbers is 6 times their geometric mean, show that numbers are in the ratio $(3+2\sqrt{2}) : (3-2\sqrt{2})$
12. If p and q are the lengths of perpendiculars from the origin to the lines $x \cos \theta - y \sin \theta = k \cos 2\theta$ and $x \sec \theta + y \operatorname{cosec} \theta = k$, respectively, prove that $p^2 + 4q^2 = k^2$

Jawahar Navodaya Vidyalaya Vechoochira Pathanamthitta
Assignment No-5 /2K18-19
MATHEMATICS (041)

Std: XI

Section A (1 mark each) (2×1m = 2m)

1. Find the centre and radius of the circle $x^2 + (y + 2)^2 = 9$..
2. Write the negation of the statement: Square root of 7 is irrational.

Section B (2 marks each) (4×2m= 8m)

3. For the statement “ If x is prime number then x is odd” , write the contrapositive and converse statement.
4. Find the equation of a circle with centre (3,4) which touches the x-axis .
5. Find the ratio in which the point (5,4,-6) divides the line joining the point (3,2,-4) and (9,8,-10)
6. Derive the equation of the set of points which are equidistant from the points (1,2,3) and (3,2,-1) .

Section C (4 marks each) (3×4m = 12m)

7. Find the equation of circle passing through the points (4,1), (6,5) and whose center lies on the line $4x + y = 16$
8. 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), find the values of a, b and c
9. If three vertices of a parallelogram ABCD are A(3,-1,2), B(1,2,-4), C(-1,1,2) Find the fourth vertex.

Section D (6 marks each) (3×6 = 18)

10. If $x^3 + 9x = 0$, where x is a real number then $x = 0$. Prove this by (a) direct method (b) Contradiction method (c) Contra positive method.
11. Find the foci , vertices , length of major axis, minor axis, latus rectum and eccentricity of the ellipse $16x^2 + 25y^2 = 400$.
12. Show that the points (5,4,-6) , (3,2,-4) and (9,8,-10) are collinear using section formula method.

Jawahar Navodaya Vidyalaya Vechoochira Pathanamthitta
Assignment No-6 /2K18-19
MATHEMATICS (041)

Std: XI

Section A (1 mark each) (2×1m = 2m)

1. If the variance of the data 2, 4, 5, 6, 8, 17 is 23.33, then find the variance of 4, 8,10,12,16,34
2. What's the probability that a randomly chosen leap year will consist of 53 Sundays?

Section B (2 marks each) (4×2m= 8m)

3. Evaluate $\lim_{x \rightarrow 0} \left[\frac{\sqrt{2+x} - \sqrt{2}}{x} \right]$
4. Differentiate $\tan x$ using quotient rule
5. Find the derivative of $f(x) = (x+1)(x-2)$ using Leibnitz product rule
6. Find the mean deviation of the data 3,10,4,7,6 from the mean

Section C (4 marks each) (3×4m = 12m)

7. Evaluate $\lim_{x \rightarrow 2} \left[\frac{1}{x-2} - \frac{2(2x-3)}{x^3 - 3x^2 + 2x} \right]$
8. Differentiate $f(x) = ax^2 + bx + c$ w.r.t. x by ab initio rule.
9. Evaluate $\lim_{x \rightarrow 0} \left[\frac{\cos ax - \cos bx}{\cos cx - 1} \right]$

Section D (6 marks each) (3×6 = 18)

10. Find the derivative of $f(x) = \sqrt{\sin x}$ by first principle
11. Suppose that each child born is equally likely to be a boy or a girl. Consider a family with exactly three children.(a) List the eight elements in the sample space whose outcomes are all possible genders of the three children. (b) Write each of the following events as a set and find its probability (i) The event that exactly one child is a girl. (ii) The event that at least two children are girls (iii) The event that no child is a girl
12. Calculate the mean variance and the standard deviation of the following data

Classes	1-10	10-20	20-30	30-40	40-50	50-60
frequency	11	29	18	4	5	3