ASSIGNMENT BOOKLET

MATHEMATICAL METHODS

Valid from 1ˢᵗ Jan, 2026 to 31ˢᵗ Dec, 2026

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THE PEOPLE'S
UNIVERSITY

School of Sciences
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(2026)

Dear Student,

Please read the section on assignments in the Programme Guide that we sent you after your enrolment. A weightage of 30 per cent, as you are aware, has been earmarked for continuous evaluation, **which would consist of one tutor-marked assignment** for this course. The assignment is in this booklet.

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Instructions for Formatting Your Assignments

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Before attempting the assignment please read the following instructions carefully.

1) On top of the first page of your answer sheet, please write the details exactly in the following format:

ROLL NO.: ……………………………………………

NAME: ……………………………………………

ADDRESS: ……………………………………………

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COURSE CODE: …………………………….

COURSE TITLE: …………………………….

ASSIGNMENT NO.: …………………….……

STUDY CENTRE: …………………….…….. **DATE:** …………………….………………...

PLEASE FOLLOW THE ABOVE FORMAT STRICTLY TO FACILITATE EVALUATION AND TO AVOID DELAY.

2) Use only foolscap size writing paper (but not of very thin variety) for writing your answers.

3) Leave 4 cm margin on the left, top and bottom of your answer sheet.

4) Your answers should be precise.

5) While solving problems, clearly indicate which part of which question is being solved.

6) This assignment is **valid from 1st Jan, 2026 to 31st Dec, 2026**. If you have failed in this assignment or fail to submit it by Dec, 2026, then you need to get the assignment for the year 2027, and submit it as per the instructions given in the Programme Guide.

7) **You cannot fill the examination form for this course** until you have submitted this assignment.

We strongly suggest that you retain a copy of your answer sheets.

We wish you good luck.

Assignment
(To be done after studying all the blocks)

1. Which of the following statements are true or false? Give a short proof or a counter-example in support of your answer. (10)

    i)   The mean of a binomial distribution, when $n = 6$ and $P(X = 4) = P(X = 2)$ is $\dfrac{3}{2}$.

    ii) Mean deviation is minimum about median.

    iii) The domain of $6x^3 - 7y^3 + 4xy$, where it is continuous is $-\infty < x < \infty, 0 < y < \infty$.

    iv) $\displaystyle\int_1^2 \dfrac{1}{x^4} dx = \dfrac{7}{23}$.

    v)   The CDF of any distribution satisfies $F(-\infty) = 0, F(\infty) = 1$ and non-decreasing.

2. a) Find $\displaystyle\lim_{x \to 2} \dfrac{x^2 + 6}{x - 1}$. (5)

    b) Differentiate $\sin x$ w.r.t. $\tan x$. (5)

3. a) For a given data, the mean and S.D. of 100 observations were obtained are 40 and 5.1 respectively. Later it was found that an observation was wrongly written as 50 instead of 40. Find the true mean and S.D. (5)

    b) If the p.d.f. of x is $f(x) = 2x^k, 0 < x < 1$ and zero elsewhere. Find k and S.D. of x. (5)

4. Given $x + y = 6$, find the least value of $x^2 + y^2$. (10)

5. a) Evaluate $\displaystyle\int \dfrac{(\sin^{-1} x)^2}{\sqrt{1 - x^2}} dx$. (5)

    b) Find the equation of the plane through the intersection of the planes $x + 2y + 3z = 4$ and $4x + 3y + 2z + 1 = 0$ and passing through the origin. (5)

6. a) How many times the combination of 4 heads and 3 tails will appear when 7 coins are tossed 1000 times? (5)

    b) The position vectors of four points A, B, C and D are $2\hat{i} + 4\hat{k}$, $5i + 3\sqrt{3}\hat{j} + 4\hat{k}$, $-2\sqrt{3}\hat{i} + \hat{k}, 2\hat{i} + \hat{k}$ respectively. Show that AB is parallel to CD and CD $= \dfrac{2}{3}$ AB. (5)

7. a) Solve $(1 - \sin x \tan y)dx + (\cos x \sec^2 y)dy = 0$. (5)

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b) Find the estimated value of $y = 70$ given the following data:

$\bar{x} = 67, \bar{y} = 65, \sigma_x = 3.5, \sigma_y = 2.5, r = 0.8$ (5)

8. For $f(x) = \theta e^{-\theta x}, x \geq 0, \theta > 0$, find the $E(x)$ and $V(x)$. (10)

9. Calculate the correlation coefficient between X and Y for the following data: (10)

X	Y
1	9
2	8
3	10
4	12
5	11
6	13
7	14
8	16
9	15

10. a) Verify Euler's theorem for: (5)

$f(x, y) = ax^2 + 2hxy + by^2$

b) The first and last term of a series are 4 and 76 respectively. The sum is given to be 1920. Find the number of terms in the series. (5)