

Council for Technical Education and Vocational Training
Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Back Exam-2078, Magh/Falgun (Scholarship+Regular)

Program: Diploma in Engineering All

Full Mark: 80

Year: I/II (New+Old Course)

Pass Mark: 32

Subject: Engineering Mathematics II

Time: 3 hrs.

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Group 'A'

Attempt All questions.

[3x(5+5)=30]

1. a) Construct a 3×3 matrix whose elements are given by [5]

$$a_{ij} = 3i - 2j.$$

- b) Solve using row equivalent matrix method or Cramer's rule. [5]

$$x + y - z = 3$$

$$2y + z = 10$$

$$5x - y - 2z = -3$$

Website:- <https://www.arjun00.com.np>

2. a) If Z and W are two complex numbers, prove that [5]
 $|z| + |w| \geq |z + w|$

- b) State and prove De-Moivre's Theorem. [5]

3. a) Using vector method, prove that [5]

$$\sin(A + B) = \sin A \cos B + \cos A \sin B$$

- b) Find the area of the parallelogram determined by the [5]
vectors $\vec{i} + \vec{j} + \vec{k}$ and $-\vec{2i} + \vec{3j} + \vec{k}$.

Group 'B'

Attempt All questions.

[10x5=50]

4. From the following table calculate the coefficient of correlation. [5]

X	4	8	10	2	6
Y	8	7	5	11	9

Cont.....

5. Find the local maxima and minima and points of inflection : [5]

$$f(x) = 2x^3 - 9x^2 - 24x + 3$$

6. Find the area of a circle $x^2 + y^2 = a^2$. [5]

7. Calculate mean, standard deviation and C.V. from the following data : [5]

Age	0-10	10-20	20-30	30-40	40-50
No. of student	7	12	24	10	7

8. If the volume of the expanding cube is increasing at the rate of $24 \text{ cm}^3/\text{min}$, how fast is the surface area increasing when the surface area is 216 cm^2 ? [5]

9. Maximize and minimize $z = 12x + 3y$ subject to $x + y \geq 12$, $3x + 2y \geq 25$ and $x, y \geq 0$. [5]

10. A coin is tossed 5 times. Find the probability of getting [5]
i) exactly 2 head ii) no head

11. Prove that : [5]

$$\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{vmatrix} = (a-b)(b-c)(c-a)(a+b+c)$$

12. Find the equation of the plane through the intersection of the planes $x + y + z = 6$ and $2x + 3y + 4z + 5 = 0$ and perpendicular to the plane $4x + 5y - 3z = 8$. [5]

13. A chance that A, B and C can solve a problem is $\frac{1}{3}, \frac{1}{4}$ and $\frac{1}{5}$ respectively. Find the probability that the problem will be solved. [5]

Good Luck!