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

Regular/Back Exam 2076, Shrawan/Bhadra

Program: Engineering All — **Full Marks: 80**

Year/ Part: I/II (New + Old Course) — **Pass Marks: 32**

Subject: Engineering Mathematic - 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) State and prove that De-Moivre's Theorem.

   (b) Prove that vector method cos(A-B) = CosA.CosB+ SinA.SinB.

2. (a) Prove that: $\begin{vmatrix} 1 & x & x^3 \\ 1 & y & y^3 \\ 1 & z & z^3 \end{vmatrix} = (x-y)(y-z)(z-x)(x+y+z)$

   (b) If $a-ib = \frac{1-ix}{1+ix}$, Prove that $a^2 + b^2 = 1$

3. (a) Calculate the arithmetic mean and standard deviation from the following data:

Marks:	0-4	4-8	8-12	12-16	16-20	20-24
No.of boys:	7	7	10	15	7	6

   (b) A Man who has 144 meters of fencing material wishes to enclose a rectangular garden. Find the maximum area he can enclose.

Group 'B'

Attempt All Questions. **[5x10=50]**

4 Using Cramer's rule or Row equivalent Matrix Method, solve:

$$x - 2y - 3z = 3$$
$$x + y - 2z = 7$$
$$2x - 3y - 2z = 0$$

5 Find inverse: $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 5 & 4 \\ 6 & 9 & 7 \end{bmatrix}$

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6. Find that the equation of the plane through the point (2, 2,1) and (3,1, 2) and perpendicular to the plane $x+2y+3z=5$.
7. Sand is pouring from a pipe at the rate of $18cm^3/sec$. The falling sand forms a cone on the ground in such a way that the height of the cone is one-sixth of the radius of the base. How fast is height of the sand cone increasing when its height is 3 cm?
8. Find the area of circle : $x^2 + y^2 = a^2$
9. ABCD is a parallelogram, G is the point of intersection of its diagonals and if O is any point. Show that:
$\overrightarrow{OA} + \overrightarrow{OB} + \overrightarrow{OC} + \overrightarrow{OD} = 4\,\overrightarrow{OG}$
10. Calculate the quartile deviation and its coefficient from the following data:

Class:	0-20	20-40	40-60	60-80	80-100
Frequency:	4	8	12	3	5

11. Find the regression equation of x on y from the following data:

X	2	4	5	6	8	11
Y	18	12	10	8	7	5

12. Suppose 3 people are selected at random from a group of 7 Men and 6 Women. What is the probability that 2 Men and 1 Women are selected?
13. Maximize : $F = 2x - y$
Subject to:

$$X + Y \leq 5$$
$$X + 2Y \leq 8$$
$$X \geq 0$$
$$Y \geq 0$$

Good luck !