Council for Technical Education and Vocational Training
Office of the Controller of Examinations
Sanothimi, Bhaktapur
Regular/Back Exam - 2073, Falgun

Program: Diploma in Civil / Electrical / Mechanical / Automobile / Electronics / Electrical & Electronics / Architecture / Geomatics / Computer Engineering & DIT — Full Marks: 80, Pass Marks:32
Year/Part: I/I [New + Old Course] — Time: 3 hrs
Subject: **Engineering Mathematics-I**

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

Attempt <u>All</u> Questions.

Group 'A' **[3×(5+5)=30]**

1. (a) State and prove Sine Law.
   (b) If $\frac{R}{r} = \frac{4}{3}$, prove that $\cos A + \cos B + \cos C = \frac{7}{4}$.

2. (a) What are the in determinant forms? Evaluate: $\lim_{x \to \theta} \frac{x \sin \theta - \theta \sin x}{x - \theta}$
   (b) Let f: R→ R defined by $f(x) = 4x–2$, find $f^{-1}(x)$.

3. (a) Prove that a quadratic equation cannot have more than two roots.
   (b) If $a^x = b^y = c^z$ and a,b,c are in G.P, then prove that x, y, z are in H.P.

Group 'B' **[10×5=50]**

Attempt <u>All</u> questions.

4. Find the derivative of $x\sqrt{x}$ or $\cos ax$ by first principle method.

5. Find $\frac{dy}{dx}$ (Any one):
   i] $x^2 + y^2 = a^2$ ii] Log Sin 2x

6. Integrate: (Any one):
   i] $\int \frac{1}{\sqrt{x+3} - \sqrt{x-1}}$ ii] $\int Sec\ x\ dx$

7. How many committees of 2 men and 3 women can be formed from 6 men and 8 women?

8. If $\cos^{-1}x + \cos^{-1}y + \cos^{-1}z = \pi$, prove that $x^2 + y^2 + z^2 + 2xyz = 1$

9. Solve for x: $\sin x + \cos x = \sqrt{2}$

10. Find the equation of the circle having centre at (2,3) and radius 5.

11. The length of perpendicular drawn from the point (a,3) on the line $3x + 4y = 5$. Find the value of a.

12. Find the equation of straight lines through the right and at right angles to the line $x^2 + 5xy + 4y^2 = 0$.

13. Find the equation of parabolal in Standard form.

Good Luck