Council for Technical Education and Vocational Training
**Office of the Controller of Examinations**
Sanothimi, Bhaktapur
**Regular/Back Exam-2075, Falgun/Chaitra**

**Program:** Diploma in DCE/ DAT/DRE/DME/DAE/DIT/ DEE/DEEX/DEX/DGE/DCOM/ Engineering — **Full Marks: 80**
**Year/Part:** I/I (New+Old Course) — **Pass Marks: 32**
**Subject:** Engineering Mathematics-I — **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) In any $\Delta ABC$ , prove that $\cos A = \frac{b^2+c^2-a^2}{2bc}$

   (b) Prove that $tan^{-1}\frac{1}{3} + tan^{-1}\frac{1}{5} + tan^{-1}\frac{1}{7} + tan^{-1}\frac{1}{8} = \frac{\pi}{4}$

2. (a) Evaluate: $\lim_{x \to \theta} \frac{x\tan\theta - \theta\tan x}{x-\theta}$

   (b) A function f(x) is defined by:

$$f(x) = \begin{cases} 2x+1 & for \quad x<1 \\ 2x & for \quad x=1 \\ 3x & for \quad x>1 \end{cases}$$

   Show that the limit of f(x) exist at x=1 is the function f(x) continuous at x=1? If not, state how can you make if continuous at x=1.



3. (a) Form a quadratic equation whose roots are the square of the roots of $4x^2+8x-5=0$

   (b) If 'a' and 'b' are two unequal positive numbers, prove that:
   (i) $(G.M)^2$ = A.M x H.M.
   (ii) A.M > G .M. > H.M.

## *Group 'B'*

**Attempt All questions.** **[10x5 =50]**

4. Find the equation of the lines through (2,-3) and making an angle of 45° with the straight line 2x-3y+7=0

Contd.....

5. Find the term independent of x in the expansion of $(x^2 + \frac{1}{x})^{12}$

6. Prove that: $\frac{1.2}{1!} + \frac{2.3}{2!} + \frac{3.4}{3!} + \ldots\ldots\ldots\ldots = 3e$

7. Solve for n: $c(n+1,4) = 6.\ c(n-1,2)$

8. Find the equation of circle touches x-axis at (3, 0) and through the point (2, 1).

( website :- arjun00.com.np )

9. Find the first principle, the derivatives of: **(any One):**

   (i) $\frac{1}{\sqrt{x}}$ (ii) cos4x

10. Integrate **(any One):**

    (i) $\int e^{tanx}.sec^2x\ dx$ (ii) $\int x^2\ sinx\ dx$

11. Solve: $\sin x + \sqrt{3}\cos x = \sqrt{2}$

12. Find the equation of a parabola in standard form.

13. Let $f : R \to R$ be defined by $f(x) = 3x-2$, find $f^{-1}(x)$ and hence find $f^{-1}(0)$, $f^{-1}(1)$ and $f^{-1}(2.)$

***Good Luck***