Council for Technical Education and Vocational Training
Office of the Controller of Examinations
Sanothimi, Bhaktapur
Regular/Back Exam-2078, Kartik/Mangsir

Program: Diploma in Civil/Hydropower/Architecture/ Electronics/IT/Computer Engineering — **Full Marks: 80**
Year/Part: II/I (2013, 2017, 2014, 2016, 2018) — **Pass Marks: 32**
Subject: Engineering Mathematics - III — **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. **[(5+5)x3=30]**

1. a) Using definition, find $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$ of $f(x,y) = x^2y - xy^2$

   b) $If\ u(x,y,z) = x^2 + y^2 + z^2, x = 2t + 1, y = t + 5\ and\ Z = 7t,$ $then\ find \frac{du}{dt}$

2. a) State limit comparisons test and use it to test the convergent or divergent of the infinite series.

   $\sum \sqrt{n^2+1} - n$

   b) Find the Fourier series of the function

   $$f(x) = \begin{cases} 1 & -\pi < x\ 0 \\ -1 & 0 \le x < \pi \end{cases}$$

3. a) Define a group and prove that the identify element of group is unique. Again prove that the inverse of a group is unique.

   b) Let $s = \{0, 1, 2, 3, 4\}$. Show that S forms a group under the addition modulo 5.

Group 'B'

Attempt Any Five questions. **[5x10=50]**

4. Solve by separating the variables : $\sqrt{1-x^2}\,dy + \sqrt{1-y^2}\,dx = 0$

5. Solve the homogeneous differential equation : $\frac{dy}{dx} = \frac{x^2+y^2}{2x^2}$

Cont.....

6. Solve the partial differential equations (Any one).

   a) $z = ax + by + a^2 + b^2$ b) $xp - yq + x^2 - y^2 = 0$

7. Solve : $(mz - ny)p + (nx - lz)q = ly - mx$

8. Test the convergent of the series and find its sum if convergent:

   $3 + \frac{3}{-4} + \frac{3}{(-4)^2} + \cdots\cdots$

9. Test whether the given series below is absolutely convergent of conditionally convergent $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{\sqrt{n}}$

10. Find the interval and radius of convergence of the power series :

    $1 + 2x + 4x^2 + 8x^3 + \cdots$

Good Luck!