Ex/ED/1.1/15/2017 (Old)

BACHELOR OF SCIENCE EXAMINATION, 2017

(1st Year, 1st Semester)

MATHEMATICS - I

Unit - 1.1

(Old Syllabus)

[EXTRA DEPARTMENTAL COURSE]

Full Marks : 30 Time : Three Hours

The figures in the margin indicate full marks.

Answer any *six* questions. 6×5=30

1. Show that

$$\left(A \cup B\right)^c = A^c \cap B^c$$

2. Define one-one and onto mapping with two examples in each category.

3. Define group. Show the cubic roots of unity form a group with respect to multiplication.

[*Turn over*]

4. Define subring. Show that a subset S of a ring $(R, +, \cdot)$ will be a subring if

   (i) $a - b \in S, \quad \forall \quad a, b \in S$

   (ii) $a \cdot b \in S, \quad \forall \quad a, b \in S$.

5. Show that the sequence is not convergent

   $$x_n = 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \ldots + \frac{1}{n}.$$

6. Define with two examples in each category of monotonic increasing and decreasing sequences.

7. If $x^p y^q = (x + y)^{p+q}$,

   prove that $\frac{dy}{dx} = \frac{y}{x}$.

8. If $u = f\left(\frac{y}{x}\right)$,

   show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 0$.
