Internal Examination 2020

DEPARTMENT OF MATHEMATICS

3RD SEMESTER

MATH-H-CC-T-05

Theory of Real Functions & Introduction to Metric Space

1. Using $\varepsilon - \delta$ definition verify $\lim_{x\to 3} \frac{1}{x} = \frac{1}{3}$ 3
2. Using sequential criterion show that $\lim_{x\to 0} cos\frac{1}{x}$ does not exists. 3
3. Let f be defined on $\mathbb{R}$ by

$$f(x) = \begin{cases} 1, if\ x\ is\ rational \\ 0, if\ x\ is\ irrational \end{cases}.$$

Show that f is not continuous at any point of $\mathbb{R}$. 4

MATH-H-CC-T-06

Group Theory 1

1. If G be a group and H be a non-empty subset of G then prove that H is a subgroup of G if for each $x, y \in H, xy^{-1} \in H$. 5
2. Which one of the following is a group and why?:

$$< \mathbb{N}, + >, < \mathbb{N}, - >$$

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MATH-H-CC-T-07

Numerical Methods & Numerical Methods Lab

1. Discuss advantage and disadvantage of Newton Forward Interpolation formulae.
2. Deduce Lagrange's interpolation formulae.

DEPARTMENT OF MATHEMATICS
3RD SEMESTER

MATH-H-SEC-T-1A

Logic and Sets

1. For any three sets A,B,C prove that
$$A\Delta(B\Delta C) = (A\Delta B)\Delta C$$
5

2. Show that the relation defined on $\mathbb{Z}$ by
$$\rho = \{(x, y): 3x + 4y \text{ is divisible by } 7\}$$
is an equivalence relation. 5