Sanjay Ghodawat University, Kolhapur

2020-21

Established as State Private University under Govt. of Maharashtra. Act No XL, 2017

EXM/P/09/00

Year and Program: S.Y B.Sc. | **School of Science** | **Department: Mathematics**

Course Code: MTS201A | **Course Title: Mathematics III** | **Semester : III**

Day : | **End Semester Examination** | **Time : 2 Hrs.**

Date : | **Max Marks : 50**

Question Paper

Instructions: 1) All Questions are compulsory.
2) Figures to the right indicates full maks.

		Marks	Bloom's Level	CO
Q.1	**Answer the following (any Two)**–			
a)	Prove that The set Q of all rational numbers is countable.	8	L_3	CO1
b)	Show that for each $n \in N$, the sum of the squares of the first n natural numbers is given by $\frac{1}{6}n(n+1)(2n+1)$	8	L_1	CO1
c)	If x and y are any real numbers with property $x < y$,then there exist a rational number $r \in Q$ such that $x < r < y$	8	L_3	CO2
Q.2	**Answer the following (any two)** –			
a)	State and prove Archimedean property.	8	L_3	CO2
b)	Show that, A sequence of real numbers is Cauchy if and only if it is convergent sequence.	8	L_4	CO3
c)	Let (x_n) be a sequence of positive real numbers such that $L = \lim_{n\to\infty}\left(\frac{x_{n+1}}{x_n}\right)$ exists. If $L < 1$, then $X = (x_n)$ converges and $\lim_{n\to\infty}(x_n) = 0$.	8	L_3	CO3
Q.3	**Answer the following (any two)** –			
a)	If a series in R is absolutely convergent, then prove that it is convergent.	9	L_2	CO4
b)	i) Let $\sum x_n$ be an absolutely convergent series in R. Then show that any rearrangement $\sum y_k$ of $\sum x_n$ converges to same value.	4	L_1	CO4

	ii) If $\phi:[a,b]\to R$ is step function, then $\phi\in R[a,b]$	5	L_1	CO5
c)	If $f:[a,b]\to R$ is Continuous function on $[a,b]$, then $f\in R[a,b]$	9	L_1	CO5

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