CODE : 4313

SEM-V EXAMINATION-Oct-2015

M-502: MATHEMATICAL ANALYSIS-I

TIME : 2:30 HOURS

TOTAL MARKS:70

INSTRUCTIONS: (1) All questions are compulsory.
(2) Each question carries equal marks.

Q.1	A	If $f \in R[a,b]$ and $g \in R[a,b]$, then prove that $fg \in R[a,b]$.	07
	B	In usual notation prove that $m(b-a) \le L(P,f) \le S(P,f) \le U(P,f) \le M(b-a)$.	07
		OR	
Q.1	A	State and prove second mean value theorem.	07
	B	Find $L(P,f)$ and $U(P,f)$ for function $f(x) = \frac{10}{x}$, $x \in [2,10]$ with partition $P = \{2,4,5,10\}$	07
Q.2	A	State and prove generalized first mean value theorem of R –integration.	07
	B	State and prove fundamental theorem of integral calculus.	07
		OR	
Q.2	A	If (X,d) is a discrete metric space, then prove that $0 < \delta \le 1 \Rightarrow N(a,\delta) = \{a\}$ and $\delta > 1 \Rightarrow N(a,\delta) = X$.	07
	B	Prove that finite intersection of open subsets of metric space is open.	07
Q.3	A	Prove that derived set of any subset of metric space is closed.	07
	B	If (X,d) is metric space and $\rho(x,y) = \frac{d(x,y)}{1+d(x,y)}$ then prove that (X,ρ) is metric space.	07
		OR	
Q.3	A	State and prove necessary and sufficient condition for subset of metric space is to be open	07
	B	State and prove Hausdroff's property for metric space.	07
Q.4	A	(X,d) is metric space and $a \in X$. f and g are real valued functions defined on X and if $\lim_{x\to a} f(x) = l$ and $\lim_{x\to a} g(x) = m$ then prove that $\lim_{x\to a}[f(x)\cdot g(x)] = l \cdot m$	08
	B	Define : open sphere and closed sphere and prove that closed sphere is closed set.	06
		OR	
Q.4	A	Define : boundary point, isolated point, dense set, perfect set Cauchy sequence, convergent sequence, closure.	07
	B	Prove that every Cauchy sequence is bounded.	07
Q.5	A	Prove that open interval of real line is open set.	07
	B	(X,d) is a metric space and $Y \subset X$. subset A of Y is open in subspace (Y,d_Y) $\Leftrightarrow$ set $G \subset X$, which is open in (X,d) such that $A = G \cap Y$.	07
		OR	
Q.5	A	Prove or disprove: (i) $\overline{A \cup B} = \bar{A} \cup \bar{B}$ (ii) $\overline{A \cap B} = \bar{A} \cap \bar{B}$	07
	B	Prove that closed interval is closed set.	07