Reg. No. : ....

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M 12701

First Semester M.Sc. Degree Examination, Nov. 2006
Paper – 1.2 : STATISTICS
Analysis

Time : 3 Hours

Max. Marks : 60

*Instructions: 1) Answer **any five** questions without omitting any unit.*
*2) **All** questions carry **equal** marks.*

UNIT – 1

1. a) Define open set. Show that intersection of any finite number of open sets is open.

   b) Show that the set of the limit points of a bounded sequence has the greatest and the least members.

   c) Let $\{a_n\}$ be a sequence, defined as $a_{n+1} = \frac{4+3a_n}{3+2a_n}$ $n \geq 1$ and $a_1 = 1$

   Show that $\{a_n\}$ convergs to $\sqrt{2}$

2. a) Prove or disprove : Every infinite bounded set has a limit point.

   b) Show that the sequence $\{a_n\}$ Where $a_n = 1 + \frac{(-1)^n}{n}$ converges.

   c) Examine the continuity at x = o if

   i) $f(x) = \begin{cases} \text{Cos}\frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$

   ii) $f(x) = \begin{cases} x^{\frac{-m}{n}} & x \neq 0 \\ 0 & x = 0 \end{cases}$

   Where m and n are positive integers.

P.T.O.

UNIT – 2

3. a) If f (x) is differentiable at a point c, show that f (x) is continuous atc. Is converse true.

   b) State and prove Rolle's theorem.

   c) Examine the maxima and minima of following functions.

   i) $f(x) = (x+5)^2 / (x^3 - 10)$ => $\frac{(x+5)^2}{(x^3-10)}$

   ii) $f(x) = \frac{7}{(x+4)^2}$

   $\frac{(x+5)^2}{x^3-10} = \frac{(x^3-10)\,2(x+5) - (x+5)^2 \cdot x^2}{(x^3-10)^2}$

4. a) State and prove Dabroux theorem.

   b) Use Taylor's theorem to show that $\cos x \geq 1 - \frac{x^2}{2}$, for all real x.

   c) Evaluate

   i) $\lim\limits_{x \to 0} \frac{x - \log(1+x)}{1 - \cos x}$ ii) $\lim\limits_{x \to \infty} x \tan \frac{1}{x}$

UNIT – 3

5. a) If $f \in R(\alpha)$ on [a, b] and $g \in R(a)$ on [a, b], prove that $C_1 f + C_2 g \in R(\alpha)$ on [a, b] for any reals C_1 and C_2.

   b) Prove or disprove : Every finite sum can be written as a Riemann-Stieltjes integral.

   c) State and prove second mean value theorem on Rieman - Stieltjes integral.

6. a) If $f \in R(a)$ on [a, b], then show that $f^2 \in R(\alpha)$ on [a, b].

   b) Evaluate $\iint\limits_D (x_1^2 + x_2^2)\, dx_1\, dx_2\, dx_3$, where D is a sphere of radius 1 centered at the organic.

   c) Find Laplace transform of

   i) t sinhat $(-1)^1 \frac{d}{ds}\left(\frac{a}{s^2-a^2}\right)$ ii) $\int\limits_0^t \frac{\sin x}{x}\, dx$

L(t sinhat) =

$= (-1)\left(\frac{a^2 \cdot 2s - (s^2 - a^2)}{(s^2-a^2)^2}\right)$

$= \frac{2a^2 s}{(s^2-a^2)^2}$