14STP01

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION MAY 2018
(First Semester)

Branch – **STATISTICS**

ANALYSIS

Time: Three Hours   Maximum: 75 Marks

Answer **ALL** questions
ALL questions carry **EQUAL** marks   (5 x 15 = 75)

1 a State and prove chain rule.
  b State and prove sufficient conditions for uniform convergence of a series.

OR

  c Suppose{fn} is a sequence of functions defined on E, or suppose $|f_n(x)| \le \mu_n$ $(x \in E,\ n = 1, 2, 3,)$. Then prove that $\sum f_n$ converges uniformly on E if $\sum M_n$ converges.

  d State and prove Weierstrass M –test.

2 a Prove that a mapping f of a metric space X into a metric space Y is continuous on X if and if $f^{-1}(v)$ is open in X for every open set V in Y.

  b Prove that If f is continuous mapping of a metric space X into a metric space Y, and if E is a connected subset of X, then f(E) is connected.

OR

  c State and prove Taylor's theorem on derivatives of higher order.

  d Prove that if f is continuous on mapping of [a, b] into R^k and f is a differentiable in (a, b) then there exists $x \in (a, b)$ such that $|f(b) - f(a)| \le (b - a)|f'(x)|$.

3 a Discuss Riemann – Stieltjes integrals.

  b Prove that if P^* is a redifinement of P then $L(P, f, \alpha) \le L(P^*, f, \alpha)$ and $U(P^*, f, \alpha) \le U(p, f, \alpha)$.

OR

  c State and prove a necessary and sufficient conditions for Riemann integrability of a bounded function defined on a closed interval [a, b].

  d State and prove fundamental theorem of integral calculus.

4 a State and prove a sufficient condition for existence of Riemann – Stieltjes integrals.

Cont...

b Prove that if $f \in R(\alpha)$ on [a, b], $M \leq f \leq M$, ϕ is continuous on [M, M] and $h(x) = \phi(f(x))$ on [a, b], then $h \in R(x)$ on [a, b].

OR

c Prove that $f \in R(\alpha)$ on [a, b], iff for every $\in > 0$, there exists a partition such that $U(p, f, \alpha) - Lp, f, \alpha) < \in$.

d Prove that if $f \in R(\alpha)$ and $g \in R(\alpha)$ on [a, b] then ,

(i) $f_g \in R(\alpha)$ (ii) $|f| = R(\alpha)$ and $\left|\int_a^b f dx\right| \leq \int_a^b |f| dx$.

5 a Discuss canonical representation of Quadratic form.

b Prove that if A be an m x p matrix and B be a p x n matrix and rank(A) = rank(B) = p, then $(AB)^+ = B^+A^+$.

OR

c Explain the properties of G-inverse.

d Discuss the method of finding G – inverse.

Z-Z-Z END