



K20U 0151

Reg. No. : .....

Name : .....

**VI Semester B.Sc. Degree (CBCSS-Reg./Supple./Improv.)**

**Examination, April 2020**

**(2014 Admission Onwards)**

**CORE COURSE IN STATISTICS**

**6B10STA : Mathematical Analysis – II**

Time : 3 Hours

Max. Marks : 48

**Instruction : Use of Calculators and Statistical Tables are Permitted.**

**PART – A : Short Answer**

(Answer **all** the questions.)

**(6×1=6)**

1. Define norm of a partition.
2. For any two partitions  $P_1, P_2$  show that  $L(P_1, f) \leq U(P_2, f)$ .
3. State the fundamental theorem of integral calculus.
4. How do you find the length of the vector  $U = (u_1, u_2, \dots, u_n)$  ?
5. Define continuity of a function of a two variables.
6. What is Beta Integral ?

**PART – B : Short Essay**

(Answer **any seven** questions.)

**(7×2=14)**

7. Show that the refinement of a partition increases the lower Riemann sum.
8. Show that the function  $f(x) = x^2$  is integrable on the interval  $[1,2]$ .
9. Show with the help of an example that functions possessing primitives are not necessarily continuous.
10. Show that the function  $[x]$  where  $[x]$  denotes the integer part of  $x$ , is integrable in  $[0, 3]$ .

P.T.O.



11. Define the term dot product of vectors and illustrate it with an example.

12. Define eigen values and eigen vectors of a matrix.

13. Find the partial derivatives of the function  $f(x, y) = \frac{x^2y + e^x}{xy}$ .

14. Expand the function  $e^x$  in the neighborhood of zero, using Taylor's theorem.

15. Test the convergence of  $\int_0^1 \frac{dx}{\sqrt{1-x^2}}$  by comparison test.

PART – C : Essay

(Answer **any four** questions.)

(4×4=16)

16. Prove or disprove the statement :  $|f|$  integrable implies  $f$  integrable.

17. Show that every continuous function is integrable.

18. Show that the eigen values of a matrix and its transpose are the same.

19. Define continuity of a function of two variables. Investigate the continuity of

$$f(x, y) = \begin{cases} \frac{xy}{\sqrt{x^2 + y^2}} & (x, y) \neq (0, 0) \\ 0 & (x, y) = (0, 0) \end{cases}$$

20. Examine the convergence of  $\int_0^1 \frac{1}{x^2} dx$ .

21. Show that  $\int_1^2 \frac{\sqrt{x}}{\log x} dx$  is divergent.

PART – D : Long Essay

(Answer **any two** questions.)

(2×6=12)

22. State and prove a necessary and sufficient condition for the integrability of a function.

23. State and prove first mean value theorem.

24. Show that if  $xyz = abc$ , the minimum value of  $bcx + cay + abz$  is  $3abc$ .

25. Define the Gamma integral and discuss about the convergence of it.