

Mahasaja Srischandra College.

B.A./B.Sc. (General) Sem - VI Internal Examination 2024.

Paper Code (Theory): MTM-5-DSEB-TH.

Full Marks! -10

Answer any five questions:

1. Show that the sequence  $S_n = 1 + (-1)^n$ ,  $n \in \mathbb{N}$  is bounded.
2. When in the trigonometrical series  $a_0 + \sum_{n=1}^{\infty} (a_n \cos nx + b_n \sin nx)$  is said to be a Fourier series?
3. Find the domain of convergence and the limit function  $f$  of  $\{f_n\}$  where  $f_n(x) = \frac{1}{n^x}$ , for  $x > 0$ .
4. Define Laplace transform for a function  $f(t)$ ,  $t > 0$ , real. Indicate the kernel of the Laplace transform.
5. Find the Laplace transformation of the function  $f$  derived by  $f(t) = 1$  for  $t \geq 0$ .
6. Find the Laplace transform  $L\{f(t)\}$  for the function  $f(x) = \sinh at$ .
7. Prove that  $L\{f''(t)\} = s^2 L\{f(t)\} - sf(0) - f'(0)$ .

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B.A./B.Sc. (General) Sem-VI. Internal Examinations 2024.

Paper Code: MTM-S-SFC B-TH.

Full Marks: 10

Answer any five questions:

1. Write down the Huntington's Postulate on "commutative" law.
2. Prove that  $(x+y)(x+z) = x+yz$ .
3. Write down the logical OR operation between two variables  $a$  and  $b$ .
4. Indicate the precedence of operations in the Boolean expression  
$$x \cdot \bar{x} + y \cdot (\overline{x+z}) + (x \cdot z)$$
5. Prove that  $\overline{AB} = \bar{A} + \bar{B}$ .
6. Apply De Morgan's Theorem to determine  $\overline{A+BC}$ .
7. Define the Full Adder.