647510 **BSCbooCC5030** **Seat No: _________**

B.Sc. Semester - 5 (CBCS) Examination
Oct/Nov. - 2018
BOOLEAN ALGEBRA AND COMPLEX ANALYSIS-1 (CORE)

Time: 2:30 Hours **Marks: 70**

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.

Q- Attempt any one out of two.

1(A) (1) Write and prove Distributive inequalities.

(2) R = {(x,y)/ x,y $\in$ Z and xy is divisible by 4}, then prove that R is equivalence relation. Also find all equivalenc

Q- Attempt any one out of two.

1(B) (1) State and prove Modular inequalities.

(2) Let (L, $*$, $\oplus$, 0, 1) be a distributive lattice then prove that if complement element a $\in$ L exist then it's a unique

Q- Attempt any one out of two.

1(C) (1) In usual notation prove that, xRy $\Leftrightarrow$ [x] = [y].

(2) If n is a positive integer and S_n is a set of all factors of n, a,b $\in$ S_n. aDb means a divides b, then show that (S_n, D

Q- Attempt any one out of two.

2(A) (1) State and prove D' morgan's law for Boolean algebra.

(2) State and prove stone's representation theorem.

Q- Attempt any one out of two.

2(B) (1) Let (B, $*$, $\oplus$, ' , 0, 1) be a Boolean algebra and x_1, x_2 $\in$ B then prove that $A(x_1*x_2) = A(x_1) \cap A(x$

(2) Let (B, $*$, $\oplus$, ' , 0, 1) be a Boolean algebra with η - variables x_1, x_2, x_3,______, x_n and mi, m_j are two different m

Q- Attempt any one out of two.

2(C) (1) If (B, $*$, $\oplus$, ' , 0, 1) is a finite Boolean algebra and x $\in$ B, x $\neq$ o then prove that there exist atom a in B such th

(2) Obtain Pos canonical form of α (x_1, x_2, x_3) = x_1, $\oplus$ (x_2*x_3).

Q- Attempt any one out of two.

3(A) (1) Let f(z) = u(x,y) + i v(x,y) is a complex function and $z_0 = x_0 + i\,y_0$ and $w_0 = u_0+iv_0$ are fixed complex constant a

$$\lim_{z\to z_0} f(z) = w_0 \text{ iff } \lim_{(x,y)\to(x_0,y_0)} u(x,y) = u_0$$

$$\text{and } \lim_{(x,y)\to(x_0,y_0)} u(x,y) = v_0$$

(2) State and prove Cauchy – Riemann conditions in Cartesian form.

Q- Attempt any one out of two.

3(B) (1) Show that $\sinh x\ \sin y$ is harmonic function & find its conjugate harmonic function.

(2) Prove that an analytic function of a constant modulus is also constant in its domain.

Q- Attempt any one out of two.

3(C) (1) Show that z^2 is entire function.

(2) Show that $f(z) = e^y (\cos x + i \ \sin x)$ is not analytic function.

Q- Attempt any one out of two.

4(A) (1) State and prove Cauchy’s Integral Formula.

) (2) State and prove Cauchy – Riemann condition for analytic function in polar form.

Q- Attempt any one out of two.

4(B) (1) In usual notation prove that,

$$\left|\int_a^b f(z)dz\right| \leq \int_a^b |f(z)|dz,$$

(2) P

Q- Attempt any one out of two.

4(C) (1) Find $\int_c \frac{dz}{z^2+4}$; $C : |z - i| = 2$.

(2) In usual notation prove that

$$\left|\int_c f(z)dz\right| \leq ML.$$

Q- Attempt any one out of two.

5(A (1) State and prove Morera’s theorem.

) (2) State and prove the fundamental theorem of algebra.

Q- Attempt any one out of two.

5(B) (1) State and prove Cauchy’s inequality.

(2) Evaluate: $\left|\int_c \frac{z^2+1}{(z-1)^3}\right.$ dz, where C: $|z| = 2$.

Q- Attempt any one out of two.

5(C) (1) Evaluate: $\int_C \frac{5z^2-7z+3}{(z-1)^2}$ dz. where $C : |z| = 2$.

(2) Evaluate: $\int_c \frac{\cosh z}{z^3}$ dz. where $C : |z| = 1$.

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