647510 **BSCmaMJ305x-6C** **Seat No :________**

B.Sc. Semester - 6 (NEP-2020) Examination

March/April-2026

MATH: Real Analysis-2 & Complex Analysis -2 (Major-15)

Time: 2:00 Hours **Marks: 50**

Instructions:

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

Que.1 Answer any two out of three. (10)

(1) State and prove Housdorff principle.

(2) X is metric space. Show that intersection of finite numbers of open subsets of X is open.

(3) Show that neighborhood is open set.

Que.2 Answer any two out of three. (10)

(1) Check whether arbitrary union and intersection of compact sets is compact or not.

(2) X is metric space and E_1 & E_2 be two connected subsets of X and $E_1 \cap E_2 \neq \phi$ then show that $E_1 \cup E_2$ is connected.

(3) Let E be a closed subset of R then prove that if E is upper bounded then lub$E \in E$.

Que.3 Answer any two out of three. (10)

(1) (a) Evaluate $\int_c \frac{z^2+3}{z^2(z-4)}\, dz$, c: $|z|$ =1

(b) Evaluate $\int_c \frac{\cosh z}{z^3}\, dz$, c: $|z|$ =1

(2) State and prove Morera's theorem.

(3) State and prove Liouville's theorem.

Que.4 Answer any two out of three. (10)

(1) State and prove Cauchy-Residue theorem.

(2) Using Residue theorem find $\int_0^{2\pi} \frac{1}{(a+cos\theta)^2}\, d\theta$

(3) Using Residue theorem find $\int_{-\infty}^{\infty} \frac{x^2}{(x^2+a^2)((x^2+b^2)}\, dx$

Que.5 Answer any two out of three. (10)

(1) X is metric space and $E \subset X$. prove that E is open iff X-E is closed.

(2) Show that compact subset of metric space is closed.

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

****