SECTION: C

III. **Attempt any two:**

2X10=20

a. (i). Prove that the external direct product of a finite number of groups is a group under component-wise product. Find the order and inverse (2,3) in $Z_3 \oplus Z_5$. Is $Z_3 \oplus Z_6$ is cyclic? justify your answer.

(7)

(ii). f: $(G, +) \rightarrow (G', *), f(x) = 2^x$. Show that f is a homomorphism.

(3)

b. (i). Prove that a homomorphism $\emptyset$ of a group is injective iff $ker\emptyset = < e >$.

(6)

(ii). Determine all homomorphism from Z_{20} to Z_8.

(4)

c. (i). Define factor group. Let $N \Delta G$ and $H < G$, containing N. then show that $H/N < G/N$.

(5)

(ii) Draw the Cayley table for $S_3 / \langle (123) \rangle$.

(5)