2) Give the logical relational schema for the database including all constraints for all involved relations. Apply the necessary normalization (if required) to eliminate any redundancy from the relations (**13 Marks**)

Ans:

The logical relational schema for the database including all constraints for all involved relations and applying normalization is given below:

STORE (store_ID, street_address, postcode, manager_ID)

PK: store_ID

FK: manager_ID references MANAGER (manager_ID)

MANAGER (manager_ID, first_name, last_name, hired_date)

PK:manager_ID

ORDER (order_num, order_date_time, completion_date_time, cost_in_pounds, store_ID, menu_item_ID)

PK: order_num

FK: store_ID references STORE(store_ID)

FK: menu_item_ID references MENU_ITEM(menu_item_ID)

MENU_ITEM (menu_item_ID, item_name)

PK: menu_item_ID

FILLING (filling_ID, filling_name, price_per_gram, calories_per_gram, category_ID)

PK: filling_ID

FK: category_ID references CATEGORY(category_ID)

CATEGORY(category_ID, category_name)

PK: category_ID

BREADTYPE (bread_ID, bread_name, price_per_loaf, number_of_calories)

PK: bread_ID

MENU_ITEM_FILLING (menu_item_ID, filling_ID, quantity)

PK: (menu_item_ID, filling_ID)

FK: menu_item_ID references MENU_ITEM(menu_item_ID)

FK: filling_ID references FILLING (filling_ID)

ORDER _BREADTYPE (order_num, bread_ID)

PK: (order_num, bread_ID)

FK: order_num references ORDER(order_num)

FK: bread_ID references BREADTYPE(bread_ID)