Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
Examination, September 2023

Course: Supply Chain Analytics **Semester: III**
Program: MBA (Business Analytics) **Time: 03 hrs.**
Course code: LSCM 8020 **Max. Marks: 100**

SECTION A

1. Each Question will carry 2 Marks
2. Instruction: Select the correct answer(s)/Fill in the blanks.

S. No.	Question	Marks	CO
Q1.1	Which of the following is not a key component of supply chain analytics? a) Inventory Management b) Demand Forecasting c) Social Media Marketing d) Supplier Relationship Management	2	CO1
Q1.2	Which statistical method is commonly used for demand forecasting in supply chain analytics? a) Linear Regression b) T-Test c) Chi-Square Test d) ANOVA	2	CO1
Q1.3	What is the difference between analytics and statistics? a) Analytics includes statistics and other components such as databases, data warehouses, and optimisation techniques. b) Statistics includes analytics and other components such as databases, data warehouses, and optimisation techniques. c) Analytics and statistics are two completely different fields of study. d) There is no difference; these concepts can be used interchangeably.	2	CO1
Q1.4	Assume that you are a regular customer of a clothing store. Which of the following best describes the prescriptive analytics component used by the store to make you a more valuable customer? a) Storing information about you and loading it into data warehouses b) Investigating correlations, sampling customer data, and summarising data c) Determining the clothing item you will most likely order on your next visit. d) Offering coupons or discounts to maximise sales or profits.	2	CO1
Q1.5	_____ optimisation model has three major components: decision variables, objective functions, and constraints. a) Global	2	CO1

	b) Open c) Constrained d) Local		
Q1.6	Supply chain management aims to_____. a) Manage and integrate supply and demand management. b) Increase the production level. c) Provide satisfaction to the customer. d) Enhance the quality of a product and services.	2	CO1
Q1.7	Which of the following optimisation techniques is often used in supply chain network design? a) Monte Carlo Simulation b) Linear Programming c) Cluster Analysis d) Principal Component Analysis	2	CO1
Q1.8	What does the "Perfect Order Index" measure in supply chain analytics? a) The number of orders delivered without delay b) The accuracy of orders, considering factors like completeness, timeliness, and condition c) The total cost of order processing d) The lead time variability	2	CO1
Q1.9	What does the "Service Level Agreement (SLA)" specify in supply chain analytics? a) The cost of products and services b) The expected level of service and performance standards between a supplier and a customer c) The duration of a supply chain project d) The terms of payment for suppliers	2	CO1
Q1.10	Which inventory management model minimises costs while meeting customer demand by balancing order quantity and holding costs? a) EOQ (Economic Order Quantity) b) LIFO (Last-In-First-Out) c) FIFO (First-In-First-Out) d) JIT (Just-In-Time)	2	CO1
SECTION B 1. Each question will carry five marks 2. Instruction: Write short notes			
Q2.1	List the five major steps involved in completing a full analytics project from start to finish.	5	CO2
Q2.2	Provide a brief explanation of the Analytic Hierarchy Process (AHP) method with an example.	5	CO2
Q2.3	The total demand for product “U” in the given year is six hundred and thirty. It is given that the setup cost is INR 102.80,	5	CO2

	and the inventory-carrying charge is INR one per unit per month. What is Economic order quantity, and how many months shall the ending inventory be zero? Note: $\sqrt{\frac{2d}{h} * S}$		
Q2.4	In a sample of 34 employees, you wish to test if the average age of employees is 35. The sample mean is 38.677 and the sample standard deviation = 7.858. The Critical value is 2.0345, and the p-value is 0.0111. $t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}}$ Test the hypothesis. Will you accept or reject the H_0?	5	CO2
SECTION C 1. Each question will carry ten marks. 2. Instruction: Answer with an explanation.			
Q3.1	The Supply Chain Operations Reference (SCOR) model developed by the Supply Chain Council provides a good framework for classifying the analytics applications in SCM. List at least ten (strategic, tactical or operational) decisions where supply chain analytics is useful.	10	CO3
Q3.2	Explain at least ten commands with an explanation for the following in the context of R programming: 1. Reading and writing data files 2. Help 3. Data Structures 4. Functions 5. Programming tools	10	CO3
Q3.3	What are the pros and cons of different distribution network designs? Also, explain at least two network model and their application.	10	CO3
SECTION D 1. Each question will carry fifteen marks. 2. Instruction: Answer with a detailed explanation.			
Q4.1	Inventories are stockpiles of raw materials, supplies, components, work-in-process, and finished goods that are kept and stored throughout a firm's supply chain. Explain the various components of the total inventory cost. Also, explain one single-period inventory model and two multiple-period inventory models	15	CO3
Q4.2	kindly explain (step by step) the code below to make the reader understand each section and line. What is the expected output? Also, comment on the quality of the code. ----------Code Starts----------	15	CO3

```
library(ggplot2)
library(caret)
library(dplyr)
data <- read.csv("winequality-red.csv")
head(data)
summary(data)
feature_names <- names(data)[-12]
plot_list <- lapply(feature_names, function(feature) {
ggplot(data, aes_string(x = feature, y = "quality")) +
geom_point() +
labs(x = feature, y = "Quality")
})
multiplot(plotlist = plot_list, cols = 3)
X <- data[, -12]
y <- data$quality
set.seed(42)
train_indices <- createDataPartition(y, p = 0.8, list = FALSE)
X_train <- X[train_indices, ]
X_test <- X[-train_indices, ]
y_train <- y[train_indices]
y_test <- y[-train_indices]
model <- train(x = X_train, y = y_train, method = "lm")
y_pred <- predict(model, newdata = X_test)
mse <- mean((y_test - y_pred)^2)
15
CO4
4
r2 <- 1 - sum((y_test - y_pred)^2) / sum((y_test -
mean(y_test))^2)
print(paste("Mean Squared Error:", mse))
print(paste("R-squared Score:", r2))

----------Code ends----------
```