

JAIPURIA INSTITUTE OF MANAGEMENT, NOIDA
PGDM / PGDM (M) / PGDM (SM)
SECOND TRIMESTER (Batch 2025-27)
END TERM EXAMINATIONS, JANUARY 2026

SET-2

Course Name	OPERATIONS MANAGEMENT	Course Code	20502
Max. Time	2 hours	Max. Marks	40 MM

INSTRUCTIONS:

- a. All Questions are compulsory.
- b. This is a closed book examination.
- c. Only calculators are allowed. Use of mobiles and any other electronic device prohibited.
- d. Answers should be rich in content and **pointwise**. Avoid unnecessarily long answers.

Read the short case below and answer the following questions:

Case: Nucleus Robotics & Nucleus Analytics

You graduated with an MBA from Jaipuria Institute of Management in 2018 and become an entrepreneur. Since then you have started your entrepreneurial venture to manufacture and sell Industrial Robots under the brand name **Nucleus Robotics**. Today the business is doing very well and generating revenue as per projections. You have a manufacturing facility located in Delhi NCR and well established supply chain network for delivering products pan India.

Spotting a trend in data analytics, you recently began exploring the possibility of a new business in this space. After talking with the business community, you have identified the need of small and medium firms for analytics services in analyzing web traffic on their websites. Given your successful track record as an entrepreneur, a number of businesses have already expressed their willingness to sign a service contract with you.

You believe in "umbrella branding," under the brand name **Nucleus** and accordingly you have decided to name your new venture as **Nucleus Analytics**.

With financing and clients lined up, you are planning to begin operating your new organization, called **Nucleus Analytics**, in three months.

Q1.

Discuss the key operations management decision you need to make in order to begin operating **Nucleus Analytics**. Examine how these decisions differ from that of **Nucleus Robotics**.

(5 Marks)

Q2.

Examine the criteria should you include in contracting with your customers of **Nucleus Analytics** to measure how well you are serving them and achieving/exceeding customer satisfaction? Compare this customer contract with that of **Nucleus Robotics**?

(5 Marks)

Q3.

Few key components of the Industrial Robots are controller (the brain), the manipulator arm (body with links and joints), end effector (tooling for tasks), actuators (motors for movement), and sensors (eyes/ears for feedback). Till now, you have been developing controllers in house and outsourcing other key components. As demand for your Industrial Robots has increased over the years, you have now decided to manufacture *Actuators* inhouse. Besides use for inhouse production of Robots, you also plan to sell surplus production of *Actuators* in the market.

You and your Operations Team is designing the assembly line for *Actuators*. As shown below, there are 10 steps to assembling one *Actuator* set. You wish to produce 750 *Actuators* per day. The workday is 7 hours long.

Design an assembly line and balance the same. Also determine efficiency of the line.

TASK	DURATION (Seconds)	PREDECESSOR
A	20	-
B	7	A
C	20	B
D	22	B
E	15	C
F	10	D
G	16	E,F
H	8	G

(4+1=5 Marks)

Q4.

The following data are monthly sales of Flagship industrial robot of Nucleus Robotics. Your Operations Manager would like to forecast sales of robots for the next month, December.

Month	Sales
June	48
July	40
August	42
September	36
October	48
November	45

4.1) Forecast sales of robots for August through November using the a) Naïve method b) Two-month moving average c) Exponential smoothing with an $\alpha = 0.2$.
(Use naïve forecast value to start the exponential smoothing forecasting process.)

4.2) Compare the forecasts using MAD and decide which is best.

(4+2=6 Marks)

Q5.

At Nucleus Robotics, one of the many smaller component required to assemble industrial robots is 9V Battery Snap Connector. Nucleus Robotics buys the connector for Rs 12 each. Annual demand is 5,200 connectors, the annual inventory holding cost rate is Rs 3 per unit, and the cost to place an order is estimated to be Rs 50.

Determine the a) Economic order quantity b) Optimum number of orders placed per year c) Total annual inventory related costs.

(2+2+2=6 Marks)

Q6.

As the demand of industrial robots is depicting an increasing trend especially in the Southern India market, you plan to construct another manufacturing facility in the southern India. Your team has identified 3 nos. sites, one each in Chennai, Bangalore and Hyderabad. Your Team has rated the important location factors for each site as follows:

Location Factors	Weight	Chennai	Bangalore	Hyderabad
Political stability	0.25	40	70	80
Economic growth	0.18	80	70	65
Port facilities	0.15	50	85	80
Container support	0.1	40	70	80
Land and construction cost	0.08	80	40	20
Transportation/distribution	0.08	40	70	60
Duties and tariffs	0.07	60	80	80
Trade regulations	0.05	60	85	85
Airline service	0.02	50	70	60
Area roads	0.02	50	60	70

Determine and recommend best site based on location factors and ratings.

(5 Marks)

Q7.

Quality Control Deptt. at Nucleus Robotics has compiled the following data about the number of customer complaints on account of defects and resulting malfunctioning of the robots.

Cause	Number of Defects
Sensors malfunctioning	83
Controller malfunctioning	3
Manipulator arm malfunctioning	7
Effector malfunctioning	13
Actuators malfunctioning	4
Connectors	17
Battery back up failed	3

Construct a Pareto Chart to identify major causes of quality defects.

(4 Marks)

Q8.

Compare between process layout and product layout using one example each from *manufacturing sector* for both of these layouts.

(4 Marks)