

PGDM, 18-20
Operations Management DM-209
Trimester-II, End Term Examination, December 2018

Time allowed: 2 hr 30 min

Max Marks: 50

Roll No: _____

Instruction: Students are required to write Roll No on every page of the question paper, writing anything except the Roll No will be treated as **Unfair Means**. In case of rough work, please use answer sheet.

Section A: Short answer questions (Five marks each. Attempt three; total marks 15)

A1. The trade-off between cost and quality implies that higher quality products/services will entail higher cost (e.g., a BMW car, or a room at the Four Seasons, Paris). At the same time, there is a saying that 'quality is free'. How do you explain this apparent contradiction?

[5 Marks]

A2. The ABC company manufactures parts of an aircraft company using three computerized numerically controlled turning centers. The firm wants to decide which machines are capable of producing a specific part with design specifications of 0.0970 inch \pm 0.015 inch. The machines have the following process parameters – machine 1 ($\bar{x} = 0.0995, \sigma = 0.004$), machine 2 ($\bar{x} = 0.1002, \sigma = 0.009$), machine 3 ($\bar{x} = 0.095, \sigma = 0.005$). Given the data, which measure of process capability will you use (C_p or C_{pk})? Determine which machines (if any) are capable of producing the products within the design specifications.

[5 Marks]

A3. True value jeans currently produces 60 pairs of jeans in an eight-hour day. The costs of production include:

Raw material: \$10.00/pair
Labor: 3 workers @ \$ 20/hour/worker
Machines: 3 machines @ \$10/hour/machine
Energy: \$1/hour of machine time

- i. Calculate the labour productivity for True value, i.e. how many jeans can be produced per hour of labour? [2 Marks]
- ii. Calculate the multi-factor productivity for True value, i.e. how many pairs of jeans can be produced per dollar spent? [3 Marks]

A4. Production processes have been classified based on production volume and degree of standardization of the products produced. Consider job shop production (batch production).

- a. For what kind of demand is job shop production suitable?
- b. What kind of facility layout is most suitable for a job shop?
- c. What is the primary advantage of the layout referred to in the part above?
- d. For what kind of demand is mass production suitable?
- e. What is the primary disadvantage of job shop production when compared with mass production?

[5 x 1 mark]

A5. Lisa Garrett is an IT resource person for her department. In the next round of computer purchase, she is determined to recommend a vendor who does a better job of documenting possible errors in the system and whose customer service is more responsive. Lisa Garrett compiled the following data for three vendors over an eight week observation period. Assume 40 hours per week.

Computer Vendor	Number of Problems	Mean time to reach customer services (hours)	Mean time to fix problems (hours)
Xceptional	5	3	2
Yourizon	10	2	1
Zelltell	25	1	0.5

- Compute the mean time between failures (MTBF) for each vendor. Which vendor has the highest MTBF?
- Compute the mean time to repair (MTTR) for each vendor.
- On the basis of *service availability* which computer vendor should Garrett select?

[2 + 1 + 2 Marks]

Section B: 10 marks each. Attempt any 2; total marks 20

B1. The home office-billing department of a chain of department stores prepares monthly inventory reports for use by the stores' purchasing agents. Given the following information, use the critical path method (CPM) to determine:

- Draw an AON network diagram.
- Calculate early start, early finish, latest start, and latest finish for each activity.
- Which activities have slack, and how much?
- Hence, identify the critical path.

[3 + 4 + 2 + 1 marks]

	Job Description	Immediate Predecessors	Time (Hours)
A	Start	-----	0
B	Get computer printouts of customer purchases	A	10
C	Get stock records for the month	A	20
D	Reconcile purchase printouts and stock records	B, C	30
E	Total stock records by department	B, C	20
F	Determine reorder quantities for coming period	E	40
G	Prepare stock reports for purchasing agents	D, F	20
H	Finish	G	0

B2. An assembly line is to operate eight hours per day with a desired output of 240 units per day. The following table of contains information on this product's task times and precedence relationships:

Task (Work elements)	Task time (Seconds)	Immediate predecessor
A	60	-----
B	80	A
C	20	A
D	50	A
E	90	B, C
F	30	C, D
G	30	E, F
H	60	G

- Draw the precedence diagram
- What is the desired cycle time required to produce 240 units per day?
- What is the theoretical minimum number of stations required to meet a forecast demand of 240 units per eight hours day?
- Assign the tasks to stations and balance the line.
- What is the efficiency of your line?

[5 x 2 marks]

B3. Radovilsky Manufacturing Company in Hayward, California, makes flashing lights for toys. The company operates its production facility 300 days per year. It has orders for about 12000 flashing lights per year and can produce at the rate of 100 units per day. Setting up the light production costs the company \$50. The cost of each light is \$1. The holding cost is \$0.10 per light per year.

- What is the optimal size of the production run?
- What is the average holding cost per year?
- What is the average setup cost per year?
- What is the total cost per year including the cost of the lights?

Section C: 15 marks

Management at the Davis Corporation has determined the following demand schedule (in units).

Month	1	2	3	4	5	6
Demand	500	800	1000	1400	2000	1600

An employee can produce an average of 10 units per month. Each worker on the payroll costs \$2,000 in regular time wages per month. In accordance with the labour contract in force, Davis Corporation does not work overtime or use subcontracting. Davis can hire and train a new employee for \$2,000 and lay off for \$500. Inventory costs \$32 per unit on hand at the end of each month. At present, 140 employees are on the payroll. The inventory at the start of month 1 is 100 units.

