Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL

I SEMESTER M.TECH. (ENGINEERING MANAGEMENT)

END SEMESTER EXAMINATIONS- NOVEMBER 2019

SUBJECT: OPERATIONS MANAGEMENT [HUM 5154]

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.

1A. Explain briefly, with a help of a neat diagram, the links between the core and support processes in a firm and a firm's external customers and suppliers within its supply chain. **4**

1B. The manufacturing unit experiences a seasonal pattern of daily volume every week. The following data for two representative weeks are expressed in thousands of pieces of product: **3**

Day	Week 1	Week 2
Sunday	8	5
Monday	15	20
Tuesday	32	30
Wednesday	30	35
Thursday	45	49
Friday	70	70
Saturday	10	15

a. Calculate a seasonal factor for each day of the week.
b. If the manager estimates 57,500 pieces of product to be sorted next week, forecast the volume for each day of the week.

1C. The following data refers to an aggregate planning problem. **3**

Quarter.	I	II	III	IV
Demand [units]	960	600	900	1240
Working days	60	60	60	62

The company is considering manufacturing at a uniform rate of l4 units/day during regular time throughout the year and sub-contract the shortage units to meet the annual demand. The production cost is Rs.100/unit, during regular time and sub-contracting cost is Rs.110/unit. Inventory carrying cost is Rs.5/unit/quarter. Calculate the total annual cost for this plan.

2A. A newspaper article service is considering modernization. Rather than manually clipping and photocopying articles of interest and mailing them to its clients, employees electronically input stories from most widely circulated publications into a database. Each new issue is searched for key words, such as a client's company name, competitors' names, type of business, and the company's products, services, and officers. When matches occur, affected clients are instantly notified via an online network. If the story is of interest, it is electronically transmitted, so the client often has the story and can prepare comments for follow-up interviews before the publication hits the street. The manual process has fixed costs of $400,000 per year and variable costs of $6.20 per clipping mailed. The price charged the client is $8.00 per clipping. The computerized process has fixed costs of $1,300,000 per year and variable costs of $2.25 per story electronically transmitted to the client. **3**

a. If the same price is charged for either process, what is the annual volume beyond which the automated process is more attractive?

b. The present volume of business is 225,000 clippings per year. Many of the clippings sent with the current process are not of interest to the client or are multiple copies of the same story appearing in several publications. The news clipping service believes that by improving service and by lowering the price to $4.00 per story, modernization will increase volume to 900,000 stories transmitted per year. Should the clipping service modernize?

c. If the forecasted increase in business is too optimistic, at what volume will the new process (with the $4.00 price) break even?

2B. A company's manager is trying to decide whether to buy one machine or two. If only one is purchased and demand proves to be excessive, the second machine can be purchased later. Some sales will be lost, however, because the lead time for producing this type of machine is six months. In addition, the cost per machine will be lower if both are purchased at the same time. The probability of low demand is estimated to be 0.30. The after-tax net present value of the benefits from purchasing the two machines together is $90,000 if demand is low and $180,000 if demand is high. If one machine is purchased and demand is low, the net present value is $110,000. If demand is high, the manager has three options. Doing nothing has a net present value of $100,000; subcontracting, $140,000; and buying the second machine, $120,000. **3**

a. Draw a decision tree for this problem.

b. How many machines should the company buy initially? What is the expected payoff for this alternative?

2C Explain the following terms with respect to forecast errors. **4**

- Bias error and MAD in Forecasting
- Expansionist strategy in Capacity Planning

3A. Kiddie's Manufacturing produces standard and super premium backyard swing sets. Currently it has four identical swing-set-making machines, which are operated 250 days per year and 8 hours each day. A capacity cushion of 20 percent is desired. The following information is also known: **3**

	Standard Model	Super Premium Model
Annual Demand	20,000	10,000
Standard Processing Time	7 min	20 min
Average Lot Size	50	30
Standard Setup Time per Lot	30 min	45 min

a. Does Kiddie's have sufficient capacity to meet annual demand?

b. If Kiddie's was able to reduce the setup time for the Super Premium Model from 45 minutes to

	30 minutes, would there be enough current capacity to produce 20,000 units of each type of swing set?	
3B.	What do you mean by the term 'Diseconomies of Scale'? What are some of the reasons why they occur?	**2**
3C.	Explain any two tools of Quality Control with suitable examples.	**2**
3D.	What are the MRP inputs? Explain with a schematic flow chart.	**3**
4A.	Grey Wolf Lodge is a popular 500-room hotel in the North Woods. Managers need to keep close tabs on all room service items, including a special pine-scented bar soap. The daily demand for the soap is 275 bars, with a standard deviation of 30 bars. Ordering cost is \$10 and the inventory holding cost is \$0.30/bar/year. The lead time from the supplier is 5 days, with a standard deviation of 1 day. The lodge is open 365 days a year. a. What is the economic order quantity for the bar of soap? b. What should the reorder point be for the bar of soap if management wants to have a 99 percent cycle-service level? c. What is the annual cost for the bar of soap, assuming a Q system will be used?	**3**
4B.	Explain any two Inventory reduction tactics.	**3**
4C.	A shop floor operates seven days a week. The requirements (in workers) are estimated as follows:	**4**

Base	M	T	W	Th	F	S	Su
Requirements	2	3	5	4	5	4	4

Each worker is required to work five days per week, and each must have two consecutive days off. What is the minimum number of workers needed?

5A. A photo-processing company intends to open a new branch store. The following table contains information on two potential locations. Which Alternative is better? Solve using Factor and Centre of Gravity method. **4**

		Scores (Out of 100)	
Factor	Weight	Alt 1	Alt 2
Proximity to existing source	.10	100	60
Traffic volume	.05	80	80
Rental costs	.40	70	90
Size	.10	86	92
Layout	.20	40	70
Operating Cost	.15	80	90
	1.00		

5B. Item H10-A is a produced item (not purchased) with an order quantity of 80 units. Complete the rest of its MRP record using the fixed order quantity FOQ, POQ and L4L rule. **6**

Item: H10-A **Lot Size: 80 units**
Description: Chair seat assembly **Lead Time: 4 weeks**

	Week									
	31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
Gross requirements		**60**				**35**		**45**		**60**
Scheduled receipts		**80**								
Projected on-hand inventory										
Planned receipts										
Planned order releases										

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