

VII SEMESTER B.TECH. (ALL BRANCHES)

END SEMESTER EXAMINATIONS- NOVEMBER 2019

SUBJECT: OPERATIONS MANAGEMENT [HUM 4014]

REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ALL the questions.
- Missing data may be suitably assumed.
- 1A. The Owner of Pearl Automotive Dealers is trying to decide whether to expand his current facility. If he expands and the demand turns weak, there is a chance he could lease part of his newly constructed facility to another dealer. If he doesn't expand and strong demand occurs, he could attempt to lease another facility across town. If they decide to expand the facility and demand turns out to be weak, they can either lease the new facility or do nothing. The payoff associated with doing nothing is \$200,000. If the property is leased, there is 80% chance of getting a return of \$100,000 and only 20% chance of earning \$400,000. On the other hand, if they don't expand the facility and demand proves to be strong, they can lease an external facility or do nothing. The payoff associated with doing nothing is \$1,300,000. If an external property is leased, there is 20% probability that the payoff will be \$1,800,000 and 80% probability of payoff being \$1,200,000. The conditional payoff when the facility is expanded, and demand is strong is \$2,000,000 and \$1,200,000 when the demand is moderate. The conditional payoff when the demand is moderate and weak when the facility is not expanded is \$900,000 and \$400,000 respectively. The probabilities of strong, moderate and weak demand are 0.5, 0.2 and 0.3 respectively.
 - a) Draw the decision tree.
 - b) Calculate the expected payoff and decide the best course of action.
- 1B. Aroma Drip Coffee Inc. produces commercial coffee machines that are sold all over the world. The 5 company's production facility has operated at near capacity for over a year now. The plant manager thinks that sales growth will continue, and he wants to develop the long-range forecasts to help plan capacity requirements. Sales record for the last ten years have been compiled.

Year	1	2	3	4	5	6	7	8	9	10
Annual Sales	1000	1300	1800	2000	2000	2000	2200	2600	2900	3200

a) Adopt an appropriate forecasting method and forecast the demand for the next three years.

b) If the actual demand for the next three years is 3275, 3550 and 3750 respectively, calculate the bias error, and percentage error.

2A. An automobile brake supplier operates on two 8-hour shifts, 5 days per week, 52 weeks per year and produces 3 components A, B and C on the same machines. The table below shows time standards, lot sizes, and demand forecasts for three components. Because of demand uncertainties, the operations manager obtained three demand forecasts (pessimistic, expected and optimistic). The manager believes that a 20% capacity cushion is best and wants to procure the machines to meet the future demand.

Part	Processing (hour/unit)	Setup (hour/lot)	Lot size units/lot	Pessimistic	Expected	Optimistic
А	0.05	1.0	60	15000	18000	25000
В	0.20	4.5	80	10000	13000	17000
С	0.05	8.2	120	17000	25000	40000

a) What is the minimum number of machines needed?

b) Comment on the capacity planning strategy being adopted by the company.

- 2B. Six jobs must be processed through three machines in the order A, B and C. The processing time (in 5 minutes) of each job on the three machines are given below. Determine
 - a) The optimum sequence.
 - b) Total time elapsed
 - c) Idle time on each machine.

Job	1	2	3	4	5	6
Machine A	20	30	15	18	33	8
Machine B	16	11	30	35	16	12
Machine C	6	40	13	22	25	17

3A. An analysis of Sultan Manufacturing Company Ltd. has led to the following information.

Cost Element	Variable Cost (% of sales)	Fixed Cost (Rs.)	
Direct Materials	32.8		
Direct Labour	28.4		
Factory Overheads	12.6	1,89,900	
Distribution Overheads	4.1	58,400	
General Administration	1.1	66,700	

Budgeted sales are Rs.18,50,000. You are required to determine:

- a) The Break-Even Sales Volume.
- b) The profit at the budgeted sales volume.
- c) The profit if the actual sales drop by 10% and increase by 5% from the budgeted sales.

- **3B.** Use the longest work element rule to balance the assembly line described in the following table so **5** that it will produce 40 units per hour. Also determine:
 - a) The cycle time.
 - b) Theoretical minimum number of stations.
 - c) The work elements that are assigned to each workstation.
 - d) The efficiency of the line.

Work Element	Time	Immediate Predecessor
А	40	-
В	80	А
С	30	А
D	25	В
E	20	С
F	15	В
G	60	В
Н	45	D
I	10	E, G
J	75	F
К	15	H, I, J
Total	415	

Five jobs are waiting to be processed at a workstation. Their work times and due dates are given in the following table. Determine the sequence as per FCFS, EDD and SPT rule and calculate the average flow time and average lateness.

Job	Processing Time (Days)	Due Date (Days)
А	6	8
В	2	6
С	8	18
D	3	15
Е	9	23

4B A bowling ball manufacturer is considering two capacity plans for the next year: level capacity with 5 inventory and matching the demand. The quarterly demand is as shown below. The labour standard is 1.6 hours per bowling ball, hiring cost is \$600 per worker hired, layoff cost is \$400 per worker laid off, carrying cost for finished good is \$5 per bowling ball per quarter, there is no beginning inventory for the first quarter, 83 workers are employed at the end of fourth quarter of the previous year, and the company produces bowling balls 8 hours per day, 62 days per quarter.

Quarter	Aggregate Demand (units)		
1	14,500		
2	22,800		
3	34,600		
4	30,200		

Based on the information given, Which capacity plan would you recommend?

- 5A Discuss the eight types of wastes as classified by Lean philosophy.
- **5B** Discuss in brief, various costs of quality.

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