Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL

VII SEMESTER B.TECH. (ALL BRANCHES)

END SEMESTER EXAMINATIONS (MAKE UP) DECEMBER/JANUARY

02/01/2020

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 Oil India Corporation is considering whether to go for an offshore oil drilling contract to be awarded in Bombay High. If they bid, the investment cost would be Rs.600 million with a 65% chance of gaining the contract. They may set up a new drilling operation or move already existing operation, which has proved successful, to the new site. The probability of success and expected returns are as follows: **5**

Outcome	New Drilling Operation		Existing Operation	
	Probability	Expected Profit (Rs. In millions)	Probability	Expected Profit (Rs. In millions)
Success	0.75	800	0.85	700
Failure	0.25	200	0.15	350

If the Corporation do not bid or lose the contract, they can use the investment amount (Rs.600 million) to modernize their operation. This would result in profits of either 5% or 8% on the sum invested with probabilities 0.45 and 0.55.

- Construct a decision tree for the problem.
- By applying expected payoff criterion, recommend the best course of action for Oil India Corporation.

1B. The demand for Krispee Crunchies, a favorite breakfast cereal of people born in the 1940s, is experiencing a decline. The company wants to monitor demand for this product closely as it nears the end of its life cycle. The following table shows the actual sales history for January–October. **5**

a. Generate forecasts for November–December, using the trend projection by regression method.

b. Looking at the accuracy of its forecasts over the history file, as well as the other statistics provided, how confident are you in these forecasts for November–December?

Month	Sales	Month	Sales
January	890,000	June	780,000
February	800,000	July	710,000
March	825,000	August	730,000
April	840,000	September	680,000
May	730,000	October	670,000

2A. **5**

Tuff-Rider, Inc., manufactures touring bikes and mountain bikes in a variety of frame sizes, colors, and component combinations. The projected demand, lot size, and time standards are shown in the following table:

Item	**Touring**	**Mountain**
Demand forecast	4,000 units/year	12,000 units/year
Lot size	130 units	110 units
Standard processing time	0.2 hours/unit	0.75 hours/unit
Standard setup time	2 hours/lot	3 hours/lot

The shop currently works 8 hours a day, 5 days a week, 50 weeks a year. It operates five workstations, each producing one bicycle in the time shown in the table. The shop maintains a 15 percent capacity cushion. How many workstations will be required next year to meet expected demand without using overtime and without decreasing the firm's current capacity cushion?

2B. The MHD Masala company has to process five items on three machines:- A, B & C. Processing times are given in the following table: **5**

Job	**1**	**2**	**3**	**4**	**5**
Machine A	4	9	8	6	3
Machine B	4	5	3	2	6
Machine C	6	9	11	8	7

Determine:

a) The optimum sequence.

b) Total time elapsed

c) Idle time on each machine.

3A. A beverage manufacturing company produces a single article. Following cost data is given about its product:- **5**

Selling price per unit	Rs.40
Marginal cost per unit	Rs.24
Fixed cost per annum	Rs. 16000

Calculate:

i. P/V ratio
ii. Break even sales
iii. Sales to earn a profit of Rs. 2,000
iv. Profit at sales of Rs. 60,000
v. New break even sales, if price is reduced by 10%.

3B. A company is setting up an assembly line to produce 192 units per 8-hour shift. The following table identifies the work elements, times, and immediate predecessors: **5**

Work Element	Time	Immediate Predecessor
A	40	None
B	80	A
C	30	D, E, F
D	25	B
E	20	B
F	15	B
G	120	A
H	145	G
I	130	H
J	115	C, I
Total	**720**	

Draw the precedence diagram and calculate:

i. The cycle time.
ii. Theoretical minimum number of stations.
iii. The work elements that are assigned to each workstation.
iv. The efficiency of the line.

4A The Taylor Machine Shop rebores engine blocks. Currently, five engine blocks are waiting for processing. At any time, the company has only one engine expert on duty who can do this type of work. The engine problems have been diagnosed, and the processing times for the jobs have been estimated. Expected completion times have been agreed upon with the shop's customers. The accompanying table shows the current situation. **5**

Engine Block	Business Hours Since Order Arrived	Processing Time, Including Setup (hours)	Business Hours Until Due Date (customer pick up time)
Ranger	12	8	10
Explorer	10	6	12
Bronco	1	15	20
Econoline 150	3	3	18
Thunderbird	0	12	22

Because the Taylor Machine Shop is open from 8:00 A.M. until 5:00 P.M. each weekday, plus weekend hours as needed, the customer pickup times are measured in business hours from the current time. Determine the schedule for the engine expert by using (a) the EDD rule and (b) the SPT rule. For each rule, calculate the average flow time, average hours early, and average hours past due. If average past due is most important, which rule should be chosen?

4B Management at the Kerby Corporation has determined the following aggregated demand schedule (in units): **5**

Month	1	2	3	4	5	6	7	8	9	10	11	12
Demand	500	800	1,000	1,400	2,000	3,000	2,700	1,500	1,400	1,500	2,000	1,200

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. Undertime is paid at the same rate as regular time. In accordance with the labor contract in force, Kerby Corporation does not work overtime or use subcontracting. Kerby can hire and train a new employee for $2,000 and lay off one for $500. Inventory costs $32 per unit on hand at the end of each month. At present, 140 employees are on the payroll and anticipation inventory is zero.

a) Prepare an aggregate plan using a chase strategy, relying only on hiring and layoffs.
b) Prepare a mixed-strategy aggregate plan that uses only a level workforce and anticipation inventory through month 7 (an adjustment of the workforce may be made before month 1 begins) then switches to a chase strategy for months 8–12.

Contrast these two plans on the basis of annual costs.

5A Briefly explain the financial measures of supply chain performance. **5**

5B With respect to the philosophy of total quality management, discuss in brief, the principles related to 'customer satisfaction'. **5**

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