

Semester: Jan – Mar 24								
Maximum Ma	arks: 50	Examination: ETE Exam	Date: 30-03-24	Duration: 3 Hrs				
Programme c Programme: 1	ode: 01 Master of Bu	siness Administration		Class: FY	Trimester: III			
College: K. J. Somaiya Institute of Management					Name of the department/Section/Center: Business Analytics			
Course Code:	Course Code: 217P01C312				Name of the Course: Decision Science			
Instructions: 1. 2. 3. 4. 5. 6. 7.	You have to You will be Make suital Write all re Use Excel a Make only 1	attempt 5 questions in all. Ques assessed for your abilities to forr ole assumptions if required and s levant answers and interpretatio nd Solver as required and keep <u>s</u> I Excel file with different worksh	tion 1 is compulsory. Do a nulate the O.R. problem, tate them. ns in your excel sheet with aving the file every ten mi eets pertaining to each qu	nny 4 questions Questio model it in excel, solve n sufficient details to er <u>inutes</u> or so. lestion.	on 2 to Question 6. All questions car it with Solver, and interpret the res nable a fast evaluation of your answ	ry equal marks. sults. ers.		
/•	Name the files as instructed by the IT staff invigilator.							

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T	he Porsche C	lub of Ame	rica sponsors driver e	education events the	at provid	de high p	erformance drivin	g instruction on actua	al race tracks. Becaus		
sa	safety is a primary consideration at such events, many owners elect to install roll bars in their cars. Deegan Industries manufactures two types of										
rc	oll bars for F	orsches. Mo	odel DRB is bolted to	the car using ex	sting ho	les in the	car's frame. Mo	tel DRW is a heavie	r roll bar that must t		
W	velded to the	car's frame	. Model DRB require	es 20 pounds of a	pecial h	nigh alloy	steel, 40 minutes	of manufacturing th	me, and 60 minutes of		
a	ssembly time	e. Model DR	w requires 25 pound	s of the special hi	h alloy s	steel, 100	minutes of manu	facturing time, and 4	to optimize the most		
	uithin the near	profit contr	ioutions are used to g	formulation holow	ont iune	cuon. A li	near programing p	broblem is formulated	to optimize the prof		
	within the resource limitations as shown in the formulation below: $M_{DV} = 200DRB + 280DRW$										
		e t	2000100	2002100							
		5.1.	20 א מ ט ע	25D PW	< 1	0 000	Steel over	vilable			
			20DRD +		= 4	0,000	Monuface				
			40DRB +	100 <i>DKW</i>	$\geq 120$	0,000	Manufac	turing minute	es		
	$60DRB + 40DRW \le 96,000$ Assembly minutes										
			oob nb			/					
			DRB, D	$RW \ge 0$		,					
U	Jse the sensiti	ivity report s	DRB, D	$RW \ge 0$ In the questions that	follow.	DO NOT	<b>SOLVE AGAIN</b>	ι.			
U	Jse the sensiti Variable	ivity report s <b>Cells</b>	DRB, D	$PRW \ge 0$ r the questions that	follow.	DO NOI	<b>SOLVE AGAIN</b>	ī.			
U	Jse the sensiti Variable	ivity report s Cells	DRB, D	$PRW \ge 0$ or the questions that Final	follow.	DO NOT	SOLVE AGAIN	Allowable	Allowable		
U	Jse the sensiti Variable Cell	ivity report ( Cells	DRB, D given below to answer	$RW \ge 0$ In the questions that Final Value	follow. I Rec e (	DO NOT duced Cost	r SOLVE AGAIN Objective Coefficient	Allowable Increase	Allowable Decrease		
υ	Use the sensiti Variable Cell \$B\$2	ivity report a Cells DRB	DRB, D given below to answer	$RW \ge 0$ In the questions that Fina Value 10	follow. I Rec e (	DO NOT duced Cost 0	SOLVE AGAIN Objective Coefficient 200	Allowable Increase 24	Allowable Decrease 88		
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	d. Simultaneously with increase in manufacturing time, Deegan Industries is supplied with an additional 500 pounds of the steel alloy. Will this be profitable for Deegan? Explain									
Q2	A. An investor is given the	A.       An investor is given the following investment alternatives and percentage rates of return.         States of Nature (Market Conditions)								
	-	Low	Medium	High						
	Regular shares	2%	5%	8%						
	Risky shares	-5%	7%	15%						
	Property	-10%	10%	20%						
	On the basis of these data, state the <b>B</b> . In a small town, there divided between the two, because prequally good customer service. Ass Diwali sales during the first week of advertising firm store ABC constru	On the basis of these data, state the optimal investment strategy for the investor under the Hurwicz Rule (=0.3) and the LaPlace Criterion. <b>B.</b> In a small town, there are only two stores that handle sundry goods-ABC and XVZ. The total number of customers is equally divided between the two, because price and quality of goods sold are equal. Both stores have good reputation in the community, and they render equally good customer service. Assume that a gain of customer by ABC is a loss to XVZ and vice versa. Both stores plan to run annual pre-Diwali sales during the first week of November. Sales are advertised through a local newspaper, radio or television media. With the aid of an								
	autoraning initi, store rabe const <u>ru</u>	Strategy of XVZ								
		Strategy of ABC	Radio	Televisio	 )n					
	-	Newspaper	40	-80						
	-	Television	20	50						
	Determine optimal strategies for bot	h players ABC and XYZ	and interpret the value	of the game.						
Q3	A trust officer at the Blacksburg Nat	tional Bank needs to dete	ermine how to invest \$1	00,000 in the follo	wing collection of bonds to maximize th	e 10				
	annual return.	Annual Return	Maturity	Risk	Tax-Free					
	A	9.5% 8.0%	Long	High	Yes					
	C	9.0%	Long	Low	No					
	D	9.0%	Long	High	Yes					
	E	9.0%	Short	High	No					
	<ul> <li>The officer wants to invest at least 50% of the money in short-term issues and no more than 50% in high-risk issues. At least 30% of the funds should go into tax-free investments and at least 40% of the total annual return should be tax-free.</li> <li>a. Formulate an LP model for this problem.</li> <li>b. Create a spreadsheet model for this problem and solve it using Solver.</li> <li>c. What is the optimal solution?</li> </ul>									
Q4	A nutraceutical company is plannir ₹3000000 per month if the monthly demand for the supplement is esti distributed between ₹230 to ₹270 s normally distributed with a mean v average monthly promotional progra	A nutraceutical company is planning a promotional program for one of its health supplements. The promotional program envisages a cost of ₹3000000 per month if the monthly demand for the supplement is estimated to not exceed 50000 packs, or ₹1000000 per month if the monthly demand for the supplement is estimated to exceed 50000 packs. The production cost of one pack of the health supplement is uniformly distributed between ₹230 to ₹270 and its selling price is ₹850 per pack. The monthly demand for the health supplement is estimated to be normally distributed with a mean value of 50000 and a standard deviation of 2000. Simulate the profit for 40 random trials & determine the average monthly profit								
Q5	Listed below is the selling price for a share of PepsiCo Inc. at the close of each year.									
		<u> </u>	lear Amou	nt						
		2	2000 35.023	30						
		2	2001 49.562	25						
		2002 48.68								
		2003 42.22								

	I			7				
		2004	46.62	_				
		2005	52.20	_				
		2006	59.85	_				
		2007	62.00	_				
		2008	77.51	-				
		2009	54.77	-				
		2010	60.80					
	<b>a.</b> Calculate a three-year moving average and weighted moving average of the given data.							
	b. Use an appropriate metric to comment or	which method is a b	better forecast for the	given data.				
	C. Plot the results and interpret.							
Q6	A market research firm's three clients each requested that the firm conduct a sample survey. Four available statisticians can be assigned to these							
	three projects; however, all four statisticians are	busy, and therefore	each can handle only	y one client. T	he following data show the number of			
	hours required for each statistician to complete ea	ch job; the differenc	es in time are based of	n experience a	nd ability of the statisticians.			
	Client							
			A B	С				
		1 1	50 210	270				
		2 1	70 230	220				
		3 1	80 230	225				
		4 1	60 240	230				
	<ul> <li>a. Solve the above assignment problem</li> <li>b. If Statistician 4 is unavailable, how of</li> </ul>	and obtain the optin loes the assignment of	nal assignment. change? Which scenar	io is more opti	mal?			