Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2021

Course: Operations Research Semester: III Program: B.Com (Hons.) Time: 03 Hours Course code: DSQT 2006 Max. Marks: 100

	SECTION A	(20 Mark	s)
1.	Each question in section A is a multiple-choice question with four answer choices. Read each question and choose the one best answer.	Marks	СО
i)	If two constraints do not intersect in the positive quadrant of the graph, then i) the problem is infeasible ii) the solution is unbounded iii) one of the constraints is redundant iv) none of the above	2	CO1
ii)	A variable which does not appear in the basic variable column of simplex table is i) never equal to zero ii) always equal to zero iii) called a basic variable iv) none of the above	2	CO1
iii)	As simulation is not an analytical model, therefore, the result of simulation must be viewed as i) Unrealistic ii) Exact iii) Approximation iv) simplified	2	CO1
iv)	In pure strategy game i) Any strategy may be selected arbitrarily ii) A particular strategy is selected by each player iii) Both players selected their optimal strategy iv) None of the above	2	CO1
v)	A saddle point exists when i) maximin value = maximax value ii) minimax value = minimum value iii) minimax value = maximin value iv) none of the above	2	CO1

vi)	Graphical Method can be applied to solve a LPP when there are only_variable(s)		
	i) One		
	ii) Two	2	CO1
	iii) Three		
	iv) More than three		
vii)	Non-negativity condition is an important component of LP model because i) Variables value should remain under the control of the decision maker ii) Value of the variables make sense and corresponds to real world problems iii) Variables are interrelated in terms of limited resources iv) None of the above	2	CO1
viii)			
	While solving a LP model graphically, the area bounded by the constraints is called i) Feasible region		
	ii) Infeasible region	2	CO1
	iii) Unbounded solution		
	iv) None of the above		
ix)			
	If for a given solution a slack variable is equal to zero then		
	i) The solution is optimal		
	ii) The solution is infeasible	2	CO1
	iii) The entire amount of resource with the constraints in which the slack variable		
	appears has been consumed iv) All of the above		
	IV) All of the above		
x)	The assignment problem		
	i) Requires that only one activity be assigned to each resource		
	ii) Is a special case of transportation problem	2	CO1
	iii) Can be used to maximize resources		
	iv) All of the above		
	SECTION B	20 Mar	ks)
This se	ection has 4 Questions of 5 marks each.		
	questions are short answer type.		
All the	e questions are compulsory.		
2.	What is meant by a feasible solution of an LP problem?	5	CO2
3.	What is an unbounded solution, and how is this condition recognized in the graphical method?	5	CO2
4	Describe the Monte Carlo Simulation technique		
4.	Describe the Fronte Carlo Simulation techniques	5	CO2
4.	Describe the Fronte Carlo Simulation teeminquen	5	CO2
4. 5.	What is meant by unbalanced transportation problem. What is degeneracy in	5	CO2

			SEC	CTION-C				(30 Ma ı	. K5)
	section has 3 Quest		,		first 2 (Questions	s are compul	sory.	
•	tions 8 has internal	choice to attemp	ot any or	ne.					1
6.	0 1 1 0 11	·			.1 1				
	Solve the follow	ring LP problems	using the	e simplex n	nethod.				
		M	az Z = x	$x_1 + x_2 + x_3$	^C 3				
	Subject to							10	CO3
		3	$x_1 + 2x$	$_2+x_3\leq 3$					
		2		$+2x_3\leq 2$					
			$x_1, x_2,$	$x_3 \geq 0$					
7.	The fellowing to	bla providas all th	20 20000	ory informa	tion on t	ha availah	aility of suppl		
/ •		ble provides all the se, the requirement							
		rehouse to each n		i iliai ket, ai	id the un	it transpo.	rtation cost (1	11	
	, in our cuois wa			Marke	et				
			P	Q	R	S	Supply]	
		A	6	3	5	4	22		
	Warehouse	В	5	9	2	7	15		
		C	5	7	8	6	O	10	CO3
		C)	/	O	U	8		
	based on his ow	Demand erk of the shippi n experience: 12	7 ng agenc	12 cy has work m A to Q,	17 xed out t l unit fro	9 The followom A to R	ving schedule	; n	
	based on his ow A to S, 15 units	Demand erk of the shippi	ng agence units from	12 cy has work m A to Q,	17 xed out t l unit fro	9 The followom A to R	ving schedule	; n	
8.	based on his ow A to S, 15 units see if the clerk h An airline comp assist in allocati scores by giving the preference.	Demand erk of the shippi n experience: 12 from B to R, 7 u	ng agence units from the flights are use with 'x'	ty has work m A to Q, a C to P and light schedus, it has asked of 10. The languitable to	17 Ked out the state of the st	9 The followom A to Refrom C to nvolves for to state the number	ving schedule R, 9 units from R. Check and Tive flights. To neir preference, the greater i	e, n d d	
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A glass factory that specializes in crystal is developing a substantial backlog and for this the firm's management is considering three courses of action: To arrange for subcontracting (S1), to begin overtime production (S2), and to construct new facilities (S3). The correct choice depends largely upon the future demand, which may be low, medium, or high. By consensus, management ranks the respective probabilities as 0.10, 0.50 and 0.40. A cost analysis reveals the effect upon the profits. This is shown in the table below:

Demand	Probability	Course of Action				
		S2		S3		
		S 1	(Begin	(Construct		
		(Subcontracting)	Overtime)	Facilities)		
Low (L)	0.1	10	-20	-150		
Medium (M)	0.5	50	60	20		
High (H)	0.4	50	100	200		

Determine the expected opportunity losses, given no other information than that stated above, and state which strategy is preferable.

SECTION-D (30 Marks)

15

CO4

This section has 2 Questions of 15 marks each, out of which Question 9 is compulsory and Question 10 has internal choice to attempt any one.

9.	The following table provides all the necessary information on the availability of
	supply to each warehouse, the requirement of each market, and the unit
	transportation cost (in ₹) from each warehouse to each market.

Market

Warehouse

P	Q	R	S	Supply
6	3	5	4	22
5	9	2	7	15
5	7	8	6	8
7	12	17	9	
	P 6 5 5 7	P Q 6 3 5 9 5 7 7 12	P Q R 6 3 5 5 9 2 5 7 8 7 12 17	P Q R S 6 3 5 4 5 9 2 7 5 7 8 6 7 12 17 9

Find out optimal cost and route of transportation.

10.	The maintenance cost and resale value per year of a machine whose purchase price is
	Rs. 7000/ - is given below:

Year	1	2	3	4	5	6	7	8
Maintenan ce Cost in ₹	900	1200	1600	2100	2800	3700	4700	5900
Resale value in ₹	4000	2000	1200	600	500	400	400	400

Determine the optimum period of replacement of the machine.

OR'

Solve the game whose payoff matrix as following and find out the value of the game.

15 CO4

		B's strategy			
		I	II	III	
	I	1	7	2	
A's strategy	II	6	2	7	
	III	5	1	6	