## LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



## **B.C.A.** DEGREE EXAMINATION – **COMPUTER APPLICATIONS**

## FIRST SEMESTER - **NOVEMBER 2022**

## **UCS 1301 - OPERATIONS RESEARCH**

Date: 01-12-2022 Dept. No. Max.: 100 Max	Date: 01-12-2022	Dept. No.	Max. : 100 Marks
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Time: 01:00 PM - 04:00 PM

a) What is operations research?  b) List the condition for solving transportation problem.  c) Define Replacement models.  d) Define dummy activity.  E) State the inventory models.  K1	1 = 5) CO1 CO1 CO1 CO1 CO1 CO1 CO1 CO1 CO1
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	CO1
e) The period of time between two consecutive placement of orders is called K1	
	CO1
1. Order cycle 2. Lead time 3. Holding cost 4. Production cost	
3. True or False. (5 x	1 = 5)
a) A set of all values of the variables satisfy all the constraints it is called feasible K2	CO1
solution.	
b) Transportation problem deals with the transportation of commodity from different K2	
sources to different destinations.	CO1

c)	When a machi	ne loses i	ts effici	ency gi	raduall	y the	mainte	enanc	e becom	es very	K2	CO1
	expensive.											
d)	CPM expands	Critical I	Path Me	thod.							K2	CO1
e)	Inventory cont	rol is not	useful	to reduc	ce the o	cost of	f trans	porta	tion and	storage.	K2	CO1
4.	Match the fol	lowing.									(5 x	x 1 = 5)
a)	Management		- 1.	North-	West o	corner	rule				K2	CO1
b)	Transportation	problem	- 2.	Progra	mme I	Evalua	ition a	nd Re	eview Te	chnique	K2	CO1
c)	Sequencing pr	oblem	- 3.	Cost as	sociate	ed wit	h carr	ying t	he inven	tory	K2	CO1
d)	PERT		- 4.	Scope	of OR						K2	CO1
e)	Holding cost		- 5.	Find th	e sequ	ence c	of the	jobs			K2	CO1
					SEC	TION	N B					
Ans	swer any TWO	of the fo	llowing	in 100	word	S					(2 x 10 =	= 20)
5.	Solve graphic	ally									K3	CO2
	Maximize Z=	$40x_1 + 1$	$00x_2$ su	bject to	the co	onstrai	ints					
	$2x_1 + x_2 \le 50$	0										
	$2x_1 + 5x_2 \le 1$	000										
	$x_1, x_2 \geq 0$											
6.	Obtain an init	ial basic	feasible	solutio	n to th	e follo	wing	trans	portation	Problem	K3	CO2
	using the nort	h-west co	rner rul	e.		1	C	1				
			D	${f E}$	F	G	St	ıppl y				
		A	11	13	17	14		250				
	-	B C	16 21	18 24	14	10		00				
		Demand	200	225	275	250	)					
7.	Determine the	optimal	sequenc	cing to	comple	ete the	follo	wing	tasks on	two	K3	CO2
	machines.										_	
	Task	A	В	C	D	E	F	G	Н	I		
	Machine 1	2	5	4	9	6	8	7	5	4		
	Machine 2	6	8	7	4	3	9	3	8	11		
8.	Solve the follo	owing ass	signmen	t probl	em						K3	CO2
			I	II		II	IV	7				
		A	10	5		13	15					
		<u>В</u> С	3 10	9		18 3	2					
			10	,		9	7	_				

the machine are given below:    Year	CO3	$2 \times 10 = \frac{10}{10}$	`	ce cos	ntenan	e mair	00. Th	Rs.20				ollowii 2.200.			
Year			315 01		iteriari	ic mun	, o. 11.	113.2	irae i	rup v					
Name			8		7	6		5		, ,				-	
Cost   When should the machine be replaced?   When should the machine be replaced?			4000	0 /	320	500	2	1800	00	12	800	500	) 5	200	Mainte-
When should the machine be replaced?  1. A marketing manager has 5 salesmen and 5 sales districts. Considering the capabilities of the salesman and the nature of districts, the marketing manager estimates that sales per month (in hundred rupees) for each salesman in each district would be as follows:    Salesman   Sales District   A B C D E   1 32 38 40 28 40   22 40 24 28 21 36   3 41 27 33 30 37   4 22 38 41 36 36   5 29 33 40 35 39   29 33 40 35 39     What is the maximum sale that may be expected if an optimum assignment is made?    The annual demand for an item is 3200 units. The unit cost is Rs.6. The inventory carrying cost is 25% per annum per unit. The cost of one procurement is Rs.150.    Determine   (i) EOQ   (ii) Number of orders per year (iii) Time between two consecutive orders (iv) Total annual cost    A small Project consisting of 12 activities have the following information regarding duration of the various activities.   Operation   O,1   O,2   O,3   1,4   2,3   2,6   3,4   3,5   4,7   5,6   5,7   6,7   Operation   Ons   5   8   3   4   0   7   4   6   6   7   2   6   Operation   Ons   5   8   3   4   0   7   4   6   6   7   2   6   Operation   Ons   5   8   3   4   0   7   4   6   6   7   2   6   Operation   Ons   5   8   3   4   0   7   4   6   6   7   2   6   Operation   Ons   5   8   3   4   0   7   4   6   6   7   2   6   Operation   Operatio															nance
A marketing manager has 5 salesmen and 5 sales districts. Considering the capabilities of the salesman and the nature of districts, the marketing manager estimates that sales per month (in hundred rupees) for each salesman in each district would be as follows:    Salesman   Sales District															cost
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1   32   38   40   28   40   20   40   20   20   30   30   37   4   22   38   41   36   36   5   29   33   40   35   39   39												<u> </u>	-	lesma	Sa
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## A # # # # # # # # # # # # # # # # #								36	21	28	24	10	4	2	
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carrying cost is 25% per annum per unit. The cost of one procurement is Rs.150.  Determine  (i) EOQ  (ii) Number of orders per year  (iii) Time between two consecutive orders  (iv) Total annual cost  2. A small Project consisting of 12 activities have the following information regarding duration of the various activities.  Operati ons	CO	17.4	What is the maximum sale that may be expected if an optimum assignment is made?												
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(iii) Time between two consecutive orders (iv) Total annual cost  2. A small Project consisting of 12 activities have the following information regarding duration of the various activities.    Operati			(i) EOQ												
(iv) Total annual cost  2. A small Project consisting of 12 activities have the following information regarding duration of the various activities.    Operati			(ii) Number of orders per year												
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regarding duration of the various activities.    Operati			(iv) Total annual cost												
Ons         0,1         0,2         0,3         1,4         2,3         2,6         3,4         3,5         4,7         5,6         5,7         6,7           Durati ons         5         8         3         4         0         7         4         6         6         7         2         6           (i)Draw the CPM Network	CO	K4	A small Project consisting of 12 activities have the following information												
ons   5   8   3   4   0   7   4   6   6   7   2   6   6   1   2   6   6   7   2   6   6   7   2   6   6   7   2   6   6   7   6   6   7   7   6   6   7   7			6,7	5,7	5,6	4,7	3,5	3,4	2,6	2,3	1,4	0,3	0,2	0,1	ons
			6	2	7	6	6	4	7	0	4	3	8	5	
				(i)Draw the CPM Network											
<ul><li>(ii) Find the critical path.</li><li>(iii) Calculate Earliest Start Time, Earliest Finish Time, Latest Start Time,</li></ul>			ne.	rt Tin	est Sta	e Late	Time	Finish	rliest	ne Ea		-			` '
Latest Finish Time and Total Float.			,			, <u>L</u>		111101							, ,

					\$	SECT:	ON D						
Ans	wer any ON	E of the	follow	ing in	250 w	ords					(1	x 20 =	20)
13.	Solve by sin	nplex m	ethod									K5	CO4
	Maximize Z	$\dot{x} = x_1 - x_2$	$x_2 + 3x_3$	subie	ect to the	e cons	raints						
			-2 . 0113	, sueje									
	$x_1 + x_2 + x_3$	≥ 10											
	$2x_1 - x_3 \le 3$												
	$2x_1 - 2x_2 + 3$	$3x_3 \le 0$		$x_1, x_2$	$2, x_3 \ge 0$								
14.	A steel firm cost of shipp given below	oing (in										K5	CO4
				Plant	S		Ca	apacity	]				
			P1	P2	P3	P4							
	Mines	M1	3	1	4	5	50						
		M2	7	3	8	6	50						
	Demand	M3	<b>40</b>	3 <b>55</b>	9 <b>60</b>	2 20	75	•					
				l		l .			]				
	How much	coal sho	ould th	e firm	purcha	ase fro	m each	mine in	order	to satisfy	the		
	demand of	the pla	ints at	mini	mal shi	ipping	expens	ses.(Usin	ig Mati	rix minii	num		
	method)												
					9	SECT	ON E						
	011	C 6.41	0 11									(1 0(	20)
Ans	wer any ONI	E of the	follow	ıng ın	1 250 W	ords						$(1 \times 20)$	) = Z()
												(1 2 2	
15.	Determine the	he seque	ence wh	hich m	ninimize	es the t	otal tim	ne for pro	ocessing	g five job	s on	K6	
15.	Determine three machin	_						_		_	s on		
5.		nes A, B						_		imes.	s on		
5.	three machin	nes A, B	and C			ng tabl	e gives	the proc	essing t	imes.	s on		
5.	three machin	nes A, B	and C			ng tabl	e gives  2  10	the proc  3	essing t  4	5 11	s on		
.5.	Machine A Machine B	nes A, B	and C			ng tabl	2 10 6	the process of the pr	essing t  4  7  3	5 11 4	s on		
.5.	three machin	nes A, B	and C			ng tabl	e gives  2  10	the proc  3	essing t  4	5 11	s on		
	Machine A Machine B Machine C	nes A, B	and C	. The	followin	ng tabl	2 10 6	the process of the pr	essing t  4  7  3	5 11 4	s on	K6	COS
	Machine A Machine B	nes A, B	and C	. The	followin	ng tabl	2 10 6	the process of the pr	essing t  4  7  3	5 11 4	s on		COS
	Machine A Machine B Machine C	nes A, B	and C  b  inform  Acti	nation ivity	following:	ng tabl	e gives  2  10  6  9	the process of the pr	essing t  4  7  3	5 11 4	s on	K6	COS
	Machine A Machine B Machine C	nes A, B	and C  b  inform  Acti  1-2	nation ivity	following:  a 3	ng tabl	2 10 6 9 m 6	the process of the pr	essing t  4  7  3	5 11 4	s on	K6	COS
	Machine A Machine B Machine C	nes A, B	3 and C  b  inform  Acti  1-2  1-6	nation ivity	:   a   3   2	ng tabl	2 10 6 9 m 6 5	the process of the pr	essing t  4  7  3	5 11 4	s on	K6	COS
	Machine A Machine B Machine C	nes A, B	3 and C  b  inform  Acti  1-2  1-6  2-3	nation ivity	:   a   3   2   6	ng tabl	e gives  2  10  6  9  m  6  5  12	the process of the pr	essing t  4  7  3	5 11 4	s on	K6	COS
	Machine A Machine B Machine C	nes A, B	3 and C  bb  Acti 1-2 1-6 2-3 2-4	nation ivity	:   a   3   2	ng tabl	2 10 6 9 m 6 5	the process of the pr	essing t  4  7  3	5 11 4	s on	K6	COS
	Machine A Machine B Machine C	nes A, B	3 and C  b  inform  Acti  1-2  1-6  2-3	nation ivity	:   a   3   2   6   2	ng tabl	e gives  2  10  6  9  m  6  5  12  5	the process of the pr	essing t  4  7  3	5 11 4	s on	K6	CO5
	Machine A Machine B Machine C	nes A, B	3 and C  bb  Acti 1-2 1-6 2-3 2-4 3-5	nation ivity	: a 3 2 6 2 5 5	ng tabl	e gives  2  10  6  9  m  6  5  12  5  11  6  9	the process of the pr	essing t  4  7  3	5 11 4	s on	K6	COS
	Machine A Machine B Machine C	nes A, B	3 and C  bb  Acti 1-2 1-6 2-3 2-4 3-5 4-5 6-7 5-8	nation ivity	: a 3 2 6 2 5 3 3 1	ng tabl	e gives  2  10 6 9  m 6 5 12 5 11 6 9 4	the process of the pr	essing t  4  7  3	5 11 4	s on	K6	CO5
	Machine A Machine B Machine C	nes A, B	3 and C  bb  Acti 1-2 1-6 2-3 2-4 3-5 4-5 6-7	nation ivity	: a 3 2 6 2 5 3 3 3	ng tabl	e gives  2  10  6  9  m  6  5  12  5  11  6  9	the process of the pr	essing t  4  7  3	5 11 4	s on	K6	CO5
16.	three machine A Machine B Machine C Given the for	nes A, B	3 and C  b  a inform  Acti  1-2  1-6  2-3  2-4  3-5  4-5  6-7  5-8  7-8  v the Pr	nation ivity	:    a   3   2   6   2   5   3   3   1   4     Network	ng tabl	e gives  2  10  6  9  m  6  5  12  5  11  6  9  4  19	the process  3 6 2 8  15 14 30 8 17 15 27 7 28	essing t  4  7  3	5 11 4	s on	K6	CO5
	i) ii)	Draw Find	3 and C  2 b  3 inform  Acti  1-2  1-6  2-3  2-4  3-5  4-5  6-7  5-8  7-8  7 the Pr  the len	nation ivity	: a 3 2 6 2 5 3 3 1 4 Network d variant	ng tabl	e gives  2  10  6  9  m  6  5  12  5  11  6  9  4  19	the process  3 6 2 8  15 14 30 8 17 15 27 7 28	essing t  4  7  3	5 11 4	s on	K6	CO5
	three machine A Machine B Machine C Given the for	Draw Find Find	3 and C  2 b  3 inform  Acti  1-2  1-6  2-3  2-4  3-5  4-5  6-7  5-8  7-8  7 the len  the crit	nation ivity roject agth antical p	:    a   3   2   6   2   5   3   3   1   4     Network of variation ath.	ng tabl	e gives  2  10  6  9  m  6  5  12  5  11  6  9  4  19  each ac	the process  3 6 2 8  15 14 30 8 17 15 27 7 28	essing t  4  7  3  6	5 11 4	s on	K6	COS

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