Printed page: 3 Subject Code: ACSBS0401

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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute)

Affiliated to Dr. A.P. J. Abdul Kalam Technical University, Uttar Pradesh, Lucknow

Course: B.Tech. Branch: CSBS

Semester IV Sessional Examination - I Year- (2021- 2022)

Subject Name: Operations Research

Time: 1.15 Hours **[SET- 1]** **Max. Marks:30**

General Instructions:

- This Question paper consists of 3 pages & 5 questions. It comprises of three Sections, A, B, and C
- Section A -Question No- 1 is objective type questions carrying 1 mark each, Question No- 2 is very short answer type carrying 2 mark each. You are expected to answer them as directed.
- Section B - Question No-3 is Short answer type questions carrying 5 marks each. Attempt any two out of three questions given.
- Section C - Question No. 4 & 5are Long answer type (within unit choice) questions carrying 6 marks each. Attempt any one part *a* or *b*.

		SECTION – A	**[08Marks]**	
1.	**All questions are compulsory**		**(4×1=4)**	
	a.	This innovative science of Operations Research was discovered during i. Civil War ii. World war II iii. World War I iv. Industrial Revolution	(1)	CO1
	b.	A photograph is an example of i. Iconic model ii. Analogue model iii. Symbolic model iv. All of the above	(1)	CO1
	c.	A model is i. An essence of reality ii. An approximation iii. An idealization iv. All of the above	(1)	CO1

	d.	Slack variable i. Is the difference between the left and right sides of a constraint? ii. Is the amount by which the left side of a is ≤ constraint is smaller than the right side. iii. Is the amount by which the left side of a is ≤ constraint is larger than the right side. iv. Exists for each variable in a linear programming problem.	(1)	CO2
2.		**All questions are compulsory**	(2×2=4)	
	a.	What is Operations Research?	(2)	CO1
	b.	What are the characteristics of Operations Research?	(2)	CO1
		SECTION – B	[10Marks]	
3.		**Answer any two of the following-**	(2×5=10)	
	a.	Discuss advantages and limitations of Operations Research.	(5)	CO1
	b.	Trace the history of Operations Research.	(5)	CO1
	c.	A paper mill produces two grades of paper namely X and Y. Owing to raw material restrictions, it cannot produce more than 400 tons of grade X and 300 tons of grade Y in a week. There are 160 production hours in a week. It requires 0.2 and 0.4 hours to produce a ton of products X and Y, respectively with corresponding profits of 200 Rs. And 500 Rs. per ton. Formulate the above as an LPP to maximize the profit.	(5)	CO2
		SECTION – C	[12Marks]	
4		**Answer any one of the following-**	(1×6=6)	
	a.	Explain the concept, scope and tools of OR as applicable to business and industry.	(6)	CO1
	b.	Find the maximum value of $Z = 20x_1 + 10x_2$ by using graphical method: Subject to constraints $x_1 + 2x_2 \leq 40$ $3x_1 + x_2 \leq 30$ $4x_1 + 3x_2 \leq 60$	(6)	CO2

		$x_1, x_2 \geq 0$		
5.		**Answer any one of the following-**	(1×6=6)	
	a.	Write briefly about the following: a) Iconic Models b) Analogue model c) Mathematical model	(6)	CO1
	b.	Solve the following LP problem by Simplex Method Max $z = 10x_1 + 6x_2$ Subject to $x_1 + x_2 \leq 2$ $2x_1 + x_2 \leq 4$ $3x_1 + 8x_2 \leq 12$ and $x_1, x_2 \geq 0$	(6)	CO2

(5) $R = 2500 kg/year$

$C = 30 Rs/kg.$

$C_3 = 130$

$C_1 = \frac{30 \times 10}{100} = 3 Rs/year$

$t = \sqrt{\frac{2 \times 130}{2500 \times 3}} = .18 year$

$= 2.16 month$

$t^* = \frac{\sqrt{\frac{2RC_3}{C_1}}}{R}$

$= \sqrt{\frac{2C_3}{RC_1}}$

$Q^* = \sqrt{\frac{2RC_3}{C_1}}$

$t = \frac{Q}{R}$

$Q = \frac{R}{n}$

$N = \frac{R}{Q}$

$N = \frac{R}{\sqrt{\frac{2RC_3}{C_1}}}$

$N = \sqrt{\frac{RC_1}{2C_3}}$

$t = \frac{1}{Nn^*}$

$t = \sqrt{\frac{2C_3}{RC_1}}$

$t = \sqrt{\frac{2C_3}{\frac{D}{T}C_1}}$