

**Cluster Innovation Centre, University of Delhi, Delhi-110007**

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Examination	:	End Semester Examination – May 2022
Name of the Course	:	B.Tech (Information Technology & Mathematical Innovation)
Name of the Paper	:	e-Business: Organization and Strategy
Paper Code	:	32867603
Semester	:	VI
Duration	:	2 Hours + 30 Minutes
Maximum Marks	:	40 Marks

**Instructions:**

*This question paper contains six questions. Attempt any four questions. All questions carry equal marks.*

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1. What is different emerging model of e-business? Explain any two models in detail with examples.
2. Trace the evolution of the e-commerce industry in India. Describe the present status, opportunities, and challenges of the e-commerce industry in India.
3. What do you understand by internet marketing? Describe the benefits and challenges of internet marketing both for the users and providers of information products and services.
4. What do you understand by the Fourth Industrial Revolution and its importance in business?
5. Name any Indian E-commerce company and trace its evolution, growth, success, and challenge before it.
6. What is organization management? Explain various theories of organizational management.

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Examination	: End Semester Examination - May 2022
Name of the Course	: B.Tech. (IT and Mathematical Innovations)
Name of the Paper	: Innovation in Education
Unique Paper Code	: 32865959
Semester	: VI (Open Elective - 5)
Duration	: 2 Hours + 30 Minutes
Maximum Marks	: 38

Instructions:

- This question paper contains SIX questions with internal choices.
- Answer any FOUR questions.
- Each question carries equal marks.

~~(1)~~ Describe term "Innovation". Explain four types of innovations with examples. ✓  
OR  
Explain your understanding of the '4Cs' that make up 'learning and innovation' a skill.  
Give examples.

~~(2)~~ Differentiate between the terms Innovation, Reforms and Changes. Give examples.  
OR  
Suggest ways of using ICT effectively for learning. ✓

~~(3)~~ Briefly describe the fundamental outcomes of innovation for the society.  
OR  
Give two examples of technology driven Innovations.

~~(4)~~ Describe two areas of essential importance for fostering a culture of innovation in the workplace. ✓  
OR

Describe three features of support system needed to promote innovation in Educational Institutions.

~~(5)~~ As per your understanding, what are the ways to make our classrooms more innovative? ✓  
OR  
Name a company that looks innovative to you. Briefly describe innovative practices it follows.

~~(6)~~ Differentiate between sustaining and disruptive innovation.  
OR  
Write an essay of 200 words on "Innovation Vs Jugad"



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Examination : End Semester Examination – May 2022  
Name of the Course : B.Tech (Information Technology and Mathematical Innovations)  
Name of the Paper : Decoding Computation Structure and Logic  
Paper Code : 32861602  
Semester : VI  
Duration : 2 Hours+ 30 minutes  
Maximum Marks : 50

Instructions:

This question paper contains six questions, out of which any four are to be attempted. Each question carries equal marks.

Q1: Define Language, Machine/Automata and Grammar and relation among them with suitable examples.

Q2: What is DFA, How to minimize a DFA which obtain from an NFA?

Q3: Design a NFA 'M' that accept all languages where 3rd symbol from right is 'a'. Also convert the same into an equivalent minimal DFA.

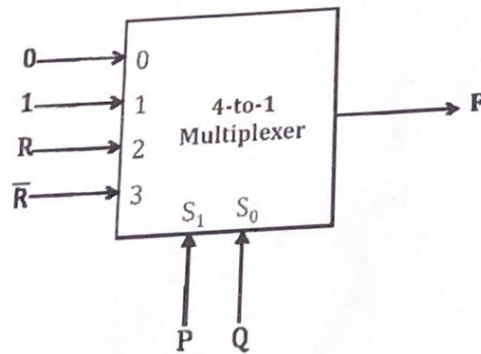
Q4: Differentiate the following with suitable example-

(a) DFA and NFA

(b) NFA with null moves and NFA without null moves

Q5: (a) Explain about Combinational circuit with suitable block diagram

(b) Consider a 4-to-1 multiplexer with two select lines  $S_1$  and  $S_0$ , given below



Find its minimal sum-of-products form of the Boolean expression for the output F of the multiplexer.

Q6: Design DFA over input alphabet  $\Sigma = \{a, b\}$

(a) an  $n \geq 0$ ,  $n \neq 2$ ,  $n \neq 4$

(b) Either odd number of a's or even number of b's but not the both together.

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**Examination** : End Semester Examination – May 2022  
**Name of the Course** : B.Tech (Information Technology and Mathematical Innovations)  
**Name of the Paper** : Internet and Web Technology  
**Paper Code** : 32861603  
**Semester** : VI  
**Duration** : 2 Hours+ 30 minutes  
**Maximum Marks** : 40

**Instructions:**

This question paper contains six questions, out of which any four are to be attempted. Each question carries equal marks.

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✓ Q1: Write Notes on HTTP, HTTPS, WWW, URL, Email

✓ Q2: What do you understand by Domain Name Service? Explain with suitable neat diagram

Q3: What is Web Browser? How this work? Explain.

Q4: Explain about Crawler. How it works and how many types are. Explain in detail.

✓ Q5: what is Search Engine? How this work and how this is differ with Web Browser?

✓ Q6: Write the brief notes on each of the following-

- (a) Firewall
- (b) Sniffing
- (c) Spoofing
- (d) Viruses
- (e) Trojan horses



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**Examination** : End Semester Examination – May 2022  
**Name of the Course** : B.Tech (Information Technology and Mathematical Innovations)  
**Name of the Paper** : Linear Construction of Actions: Engineering through Linear Programming and Game Theory  
**Paper Code** : 32861601  
**Semester** : VI  
**Duration** : 2 Hours+30 minutes  
**Maximum Marks** : 40

**Instructions:**

This question paper contains six questions, out of which any four are to be attempted. Each question carries equal marks.

1. A Manufacturing Company has a contract to deliver 100, 250, 190, 140, 220, and 110 home windows over the next 6 months. Production cost (labor, material, and utilities) per window varies by period and is estimated to be \$50, \$45, \$55, \$48, \$52, and \$50 over the next 6 months. To take advantage of the fluctuations in manufacturing cost, Acme can produce more windows than needed in a given month and hold the extra units for delivery in later months. This will incur a storage cost at the rate of \$8 per window per month, assessed on end-of-month inventory. Develop a linear program to determine the optimum production schedule.
2. Best-ride airlines that operates seven days a week has the following time-table.

Flight No.	Delhi - Mumbai		Flight No.	Mumbai-Delhi	
	Departure	Arrival		Departure	Arrival
1	7.00 AM	8.00 AM	101	8.00 AM	9.00 AM
2	8.00 AM	9.00 AM	102	9.00 AM	10.00 AM
3	1.00 PM	2.00 PM	103	12.00 Noon	1.00 PM
4	6.00 PM	7.00 PM	104	5.00 PM	6.00 PM

Crews must have a minimum layover of 5 hours between flights. Obtain the pairing of flights that minimizes layover time away from home. For any given pairing, the crew will be based at

the city that results in the smaller layover. For each pair also mention the city where crew should be based.

3. An aluminum utensils company must produce monthly at least 2400 number of plates and 2800 of bowls. The company has 3 processes available for production. The first uses a special pure grade aluminum; the other two allow for some use of recycled aluminum. Because of government regulations, the company must use 600 lb of recycled aluminum in its mostly production. The input, output and cost of 1 hr of operation of each process are as follows

	Input	Output		Cost
	Recycled Al	Plates	Bowls	
Process 1	0	6	8	65
Process 2	2	12	12	150
Process 3	3	10	15	200

Let  $x_i$  be the number of hours that Process  $i$  is used,  $1 \leq i \leq 3$ , respectively. Following are the LP model and its associated initial and final optimal simplex tableau.

Minimize  $65x_1 + 150x_2 + 200x_3$

subject to

$$6x_1 + 12x_2 + 10x_3 \geq 2400$$

$$8x_1 + 12x_2 + 15x_3 \geq 2800$$

$$2x_2 + 3x_3 = 600$$

$$x_1, x_2, x_3 \geq 0$$

	$x_1$	$x_2$	$x_3$	$x_4$	$x_5$	$x_6$	$x_7$	$x_8$	
$x_6$	6	12	10	-1	0	1	0	0	2,400
$x_7$	8	12	15	0	-1	0	1	0	2,800
$x_8$	0	2	3	0	0	0	0	1	600
	65	150	200	0	0	0	0	0	0
$x_2$	$\frac{9}{8}$	1	0	$-\frac{1}{16}$	0	$\frac{3}{16}$	0	$-\frac{5}{8}$	75
$x_3$	$-\frac{3}{4}$	0	1	$\frac{1}{8}$	0	$-\frac{1}{8}$	0	$\frac{3}{4}$	150
$x_5$	$-\frac{23}{4}$	0	0	$-\frac{3}{8}$	1	$\frac{3}{8}$	-1	$\frac{15}{4}$	350
	$46\frac{1}{4}$	0	0	$3\frac{1}{8}$	0	$-3\frac{1}{8}$	0	$-56\frac{1}{4}$	-41,250



- (a) In terms of the optimal revenue, determine the dual prices for three processors.
- (b) Determine the feasibility ranges for the dual prices obtained in (a).
- (c) Suppose that the hourly cost of process 3 may fluctuate because of the changing costs of the special materials used in this process, find the limits on the range of change of this cost before this present operating schedule is no longer optimal.
4. Three electric power plants with capacities of 25, 40, and 30 million kWh supply electricity to three cities. The maximum demands at the three cities are estimated at 30, 35, and 25 million kWh. The price per million kWh at the three cities is given in Table below.

		City		
		1	2	3
Plant	1	\$600	\$700	\$400
	2	\$320	\$300	\$350
	3	\$500	\$480	\$450

During the month of August, there is a 20% increase in demand at each of the three cities, which can be met by purchasing electricity from another network at a premium rate of \$1000 per million kWh. The network is not linked to city 3, however. The utility company wishes to determine the most economical plan for the distribution and purchase of additional energy.

- (a) Formulate the problem as a transportation model.
- (b) Determine an initial optimal distribution plan for the utility company using penalty cost method.
5. UA and DU are devising their strategies for the 1994 national championship men's college basketball game. Assessing the strengths of their respective "benches," each coach comes up with three strategies for rotating the players during the game. The ability of each team to score 2-pointers, 3-pointers, and free throws is key to determining the final score of the game. The following table summarizes the net points UA will score per possession as a function of the different strategies available to each team:

	$DU_1$	$DU_2$	$DU_3$	$DU_4$
$UA_1$	3	-2	1	4
$UA_2$	2	3	-5	0
$UA_3$	-1	2	-2	2
$UA_4$	-3	-5	4	1

Develop a linear programming model for UA and DU and explain the relationship between two models.

6. Consider the following integer linear programming problem:

$$\text{Maximize } z = 7x_1 + 10x_2$$

subject to

$$-x_1 + 3x_2 \leq 6$$

$$7x_1 + x_2 \leq 35$$

$$x_1, x_2 \geq 0 \text{ and integer}$$

the optimum Simplex LP tableau for this problem is given as

Basic	$x_1$	$x_2$	$x_3$	$x_4$	Solution
$Z$	0	0	$\frac{63}{22}$	$\frac{31}{22}$	$66\frac{1}{2}$
$x_2$	0	1	$\frac{7}{22}$	$\frac{1}{22}$	$3\frac{1}{2}$
$x_1$	1	0	$-\frac{1}{22}$	$\frac{3}{22}$	$4\frac{1}{2}$

Perform one iteration of Gomory's cutting plane method and explain that solution graphically.