Solve the following game by using the principle of dominance.

	B1	B2	B3	B4	B5	B6
A1	4	2	0	2	1	1
A2	4	3	1	3	2	2
A3	4	3	7	-5	1	2
A4	4	3	4	-1	2	2
A5	4	3	3	-2	2	2

B

Q3.   Each question carries 10 Marks.

Solve the assignment problem At the head office of a company there are five registration counters. Five persons are available for service. How should the counters be assigned to persons so as to maximize the profit?

C/P	A	B	C	D	E
1	30	37	40	28	40
2	40	24	27	21	36
3	40	32	33	30	35
4	25	38	40	36	36
5	29	62	41	34	39

A

Solve using simplex metho

Minimize $Z = 4x + 2y$

Subject to

B

$5x + y \geq 5$

$x + 3y \geq 10$

$x \geq 0, y \geq 0$

Q4.   Each question carries 10 Marks.

Solve using two phase simplex method
Maximize $Z = 4x + 5y$
Subject to $2x + 3y \leq 6$

A
$3x + y \geq 3$
$x, y \geq 0$

B

Three jobs A ,B, C are to be assigned to three machines X, Y, Z. The processing costs are as given in the matrix shown below. Find the allocation which will minimize the overall processing cost.

Machines				
		X	Y	Z
Jobs	A	19	28	31
	B	11	17	16
	C	12	15	13

Q5.   Each question carries 10 Marks.

Consider a box office ticket window being manned by a single server. Customer arrives to purchase ticket according to Poisson input process with a mean rate of 30/hr. the time required to serve a customer has an ED with a mean of 90 seconds determine:.

A   (a) Mean queue length.
      (b) Mean waiting time in the system.
      (c) The probability of the customer waiting in the queue for more than 10min.
      (d) The fraction of the time for which the server is busy.

B   What is a random number? What are the problems associated with generating pseudo random numbers.

Q6.   Each question carries 10 Marks.

Solve using Big M-method

Maximize $z = x_1 + 5x_2$

subject to

A

$3x_1 + 4x_2 \leq 6$
$x_1 + 3x_2 \geq 2$

$x_1, x_2 \geq 0$

Find the optimal solution of given transportation problem using MODI method

	Destination				
Source		D1	D2	D3	D4	Supply
	O1	3	1	7	4	250
	O2	2	6	5	9	350
	O3	8	3	3	2	400
	Demand	200	300	350	150	

B

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Time: 3 Hours   Max. Marks: 80

Note: Q.1 is compulsory.
Attempt any three questions out of remaining five questions.

Q.1   **20 marks**
  A. Differentiate between inflectional and derivational morphology.
  B. Illustrate with suitable example different levels of NLP.
  C. Identify the morphological type (Noun phrase, Verb Phrase, Adjective Phrase) of following
       sentence segments.
       1. that happy puppy
       2. the brightest
       3. leave Boston in the morning
       4. the building on the corner
       5. a cheap restaurant
  D. Explain Regular Expression.

Q.2   **20 marks**
  A. Explain lexicon, lexeme and the different types of relations that hold between lexemes.
  B. Illustrate Parts-of-speech tagging and explain different categories of POS tagging.

Q.3   **20 marks**
  A. What is morphological parsing? Explain FST with example.
  B. Explain Text Classification in detail.

Q.4   **20 marks**
  A. Describe N-gram language model. List the problems associated with N-gram model.
  B. Define the term sentiment analysis. Explain Aspect based sentiment analysis in details.

Q.5   **20 marks**
  A. Describe Hidden Markov Model (HMM).
  B. Define Text Classification and explain its types.

Q.6   Write Short note on following   **20 Marks**
  A. Dictionary based approach of WSD
  B. Parsing
  C. Lemmatization
  D. Ambiguities