Q.1 Maximise   z = 3x1 + 4x2
Subject to constrains 5x1 + 4x2≤ 200;
3x1 + 5x2 ≤150;
5x1 + 4x2≤100;
8x1 + 4x2≤80,
x1≤ 0, x2≤ 0
Answer : The

Minimise w = 200y1 + 150y2

 –

100y3

 –

80y4

Subject to constraints 5y1 + 3y2

 –

5y3

 –

8y4 ≥ 3
 4y1 + 5y2

 –

4y3

 –

4y4 ≥ 4

y1, y2, y3, y4 ≥ 0

Q.2 State the ways in which customers in a queue are served.

Answer : Queuing theory is the mathematical study of waiting lines, or queues. In queuing theory a model is constructed so that queue lengths and waiting times can be predicted.
Queuing theory started

Service Facility
Service Facility is based on three parameters
 –
Availability of service, number of service centresand duration of service.

i) Availability of service
It is necessary to examine if there are any constraints that reduce the number of customers to beserved at a time, apart from specifying the time span of the availability of service. For example, ina waiting line for a suburban train, apart from the timings of the train services, the probabilitydistribution of the number of passengers that can be accommodated in a train that arrives isrelevant.

ii) Number of service centers
If only one service centre is referred to as a service channel, obviously only one customer can beserved at a time. There will definitely be more than one service centre and the behaviour of thequeues will vary with the number of channels available for service. Multiple service channels maybe arranged in series or in parallel.Multiple service channels are arranged in series when a customer has to go through severalcounters one after another with each providing a different part of the service. For instance, bank counters where a customer has to go to at least two counters to withdraw is an example of arrangement in series.On the other hand

ticket booths in a railway station have multiple channelswith parallel arrangement.

iii) Duration of service

This is the length of time taken to serve a customer. This can be constant or varying.(a) Constant service time: Though not in practice, an assumption that service time is constant holdstrue, if the pattern of arrivals is very irregular.(b) Completely random service time: The service time can be considered completely random when:

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Q.3 Explain the use of simulation in networks? What are the advantages of using simulation?

Answer :
Simulation: is a representation of reality through the use of a model or other device, which will react in the similar manner as reality under a given set of conditions.

Q.4 Explain maximin-minimax principle. Briefly describe the characteristics of competitive game

Answer : Maxim in – Minima Principle

Q.5 A project has 10 activities. The following table shows the information about the activities.

Table 14.5: Activities information

Activity	Preceding activity	Duration in weeks
A	–	6
B	–	3
C	A	5
D	A	4
E	A	3
F	C	3
G	D	5
H	B, D, E	5
I	H	2
J	I, G, F	3

- Draw the network
- Find the project duration
- Identify the CPM
- Prepare the schedule
  Answer :

Q.6 Discuss different types of service systems?
Answer : Partly based on the experiences of SusProNet, a major Thematic network under the EU's 5th Framework Research Programme, this paper discusses the environmental and economic prospects of product-service systems (PSS). Since unlike

Note: Each question carries 10 Marks. Answer all the questions.

Q.1 Explain project management (PERT) & Project scheduling of PERT.
Answer : Some key points about PERT are as follows:

1. PERT was developed in connection with an R&D work. Therefore, it had to cope with the uncertainties that are associated with R&D activities. In PERT, the total project duration is regarded as a random variable. Therefore, associated probabilities are calculated so as to characterise it.

Q.2 Write a short note on Monte-Carlo simulation? What are the Limitations of using Simulation?
Answer : Simulation is also called experimentation in the management laboratory. While dealing with business problems, simulation is often referred to as 'Monte Carlo Analysis'. Two American mathematicians, Von Neumann and Ulan, in the late 1940s found a problem in the field of nuclear physics too complex for analytical solution and too dangerous for

Q.3 In a rectangular game, pay-off matrix of player A is as follows:
I) Solve the game.
ii) Write down the pay-off matrix of B and then, solve the game.
Answer : Value is

Q.4 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 the sales per month (in hundred rupees) for each salesman in each district would be as follows.

Sales districts		A	B	C	D	E
Salesmen	1	32	38	40	28	40
	2	40	24	28	21	36
	3	41	27	33	30	37
	4	22	38	41	36	36
	5	29	33	40	35	39

Find the assignment of salesman to districts that will result in maximum sales.
Answer : Solution:

Q.5 Define PERT & CPM. Write down the basic difference between PERT and CPM.
Answer : A PERT chart is a project management tool used to schedule, organize, and coordinate tasks within a project. PERT stands for Program Evaluation Review Technique, a methodology developed by the U.S. Navy in the 1950s to manage the Polaris submarine missile program. A similar methodology, the Critical Path Method (CPM) was developed for project management in the private sector at about the same time.

Q.6 Explain Linear programming problem by giving two examples & write any 3 applications of Linear Programming problem Salesman
Answer : The LPP is a class of mathematical programming