Roll No.....

Total No. of Questions—6] [Total No. of Printed Pages—4

Time Allowed—3 Hours Maximum Marks—100

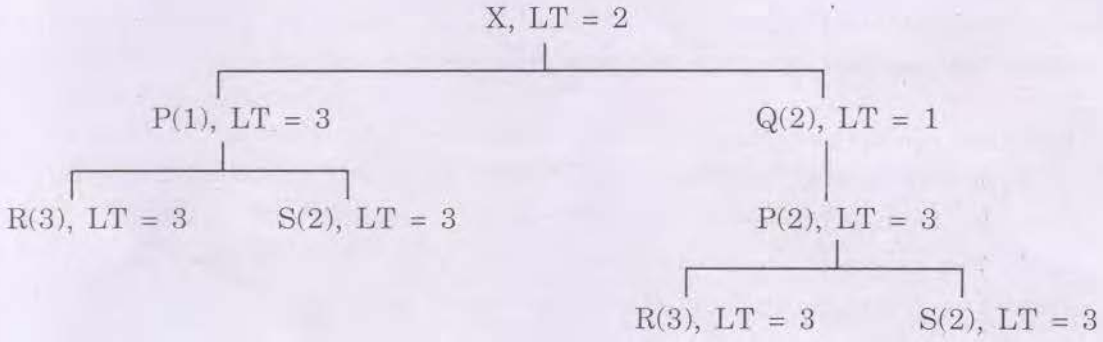
GUN

Answer any **five** questions.

Marks

1. (a) Briefly explain the functions that an operations management department is expected to perform in a modern organisation. 8

   (b) The product structure and the lead time for a finished product "X" are given below : 12



   If 100 units of X are required in week 12 and if none of the components, sub-assemblies and the end-product are either on hand or on order, compute the amount and dates of the planned order releases for all the components and sub-assemblies. Assume that there is no particular order size and therefore all the order quantities are lot for lot.

2. (a) Define facilities layout and explain its objectives. 5

   (b) Given the information provided in the accompanying network diagram, determine each of the following :

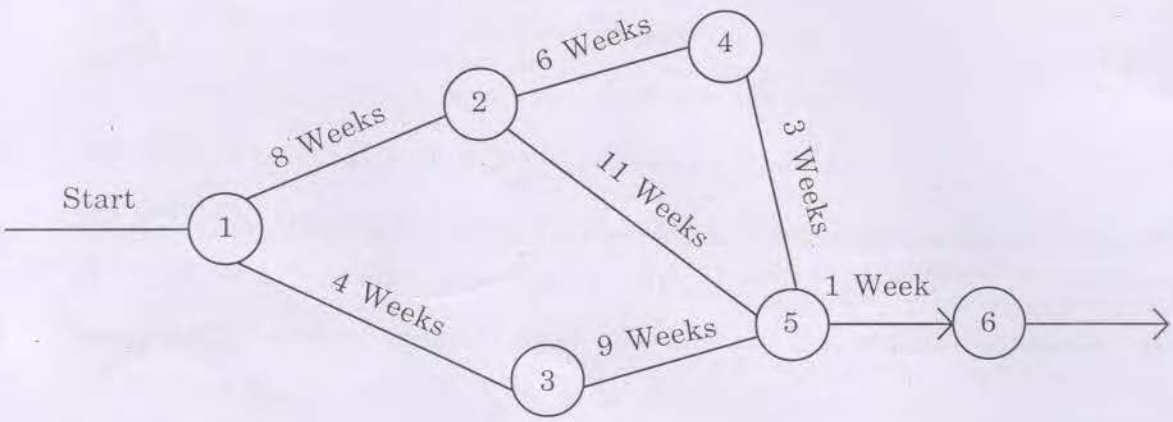
   (i) The length of each path. 3

Marks

(ii) The critical path. 2

(iii) The expected length of the project. 2

(iv) Amount of slack time for each path. 8



3. (a) Write an explanatory note on six sigma quality control. 5

(b) Prembai undertakes knitting of sweaters for various shops. She has several helping hands who, besides knitting also carry out cleaning, disentangling woollen thread, measuring and cutting, sewing and customer contact activities. Hema, an enthusiastic industrial engineer, did an activities sampling (work sampling) study and came up with the following data : 15

Activity	No. of Observations
Knitting	120
Cleaning	40
Disentangling	75
Measuring and Cutting	20
Sewing	20
Speaking to customers	25
Total no. of observations	300

Marks

Hema rated the help she had observed at 95 for the disentangling activity and 100 for the knitting activity. If at the end of the four-day (36 work hours) study, Hema found that the helping hand had disentangled 2.3 kg of Woollen thread and knitted a two-meter-length equivalent, what are the standard times for these activities ? Take total allowances at 25 per cent.

If Prembai gives the work of disentangling woollen thread to a helper for four hours, how much wool should be disentangled ?

4. (a) Given the information below, compute the efficiency and the utilisation of the vehicle repair department : 5

Design capacity	=	80 trucks per day
Effective capacity	=	40 trucks per day
Actual output	=	36 units per day.

(b) An activity is known to have an 80 percent learning curve. It has just taken a worker 10 hours to produce the first unit. Determine expected completion times for these units : the 2nd, 4th, 8th and 16th (note successive doubling of units). 5

(c) A lab orders a number of chemicals from the same supplier every 30 days. The assistant manager of the lab must determine how much of one of these chemicals to order. A check of stock revealed that 11.25 millilitre jars are on hand. Daily usage of the chemical is approximately normal with a mean of 15.2 ml per day and a standard deviation of 1.6 ml per day. The desired service level for this chemical is 95 percent.

(i) How may bottles of the chemical should be ordered ? 6

(ii) What is the average amount of safety stock of the chemical ? 4

5. (a) In a Private Hospital, one of the specialist Doctor examines patient at the rate of 25 minutes per patient. 8

A study found that the patient arrival rate is 15 patient per hour. Considering arrival follows position and service exponential, find :

(i) Utilisation of the doctor.

(ii) Average No. in the waiting line.

Marks

(iii) Average No. in the system.

(iv) Average waiting time in the line.

(v) Average waiting time in the system, including service.

(b) Customers arrive at a bakery at an average of 18 per hour on week day mornings. The arrival distribution can be described by a poison distribution with a mean of 18. Each clerk can serve a customer in an average of four minutes, and this time can be described by an exponential distribution with a mean of 4.0 minutes.

(i) What are the arrival and service rates ? 3

(ii) Compute the average number of customers being served at any time. 2

(iii) Suppose it has been determined that the average number of customers waiting in line is 3.6. Compute the average number of customers in the system (i.e., waiting in line or being served), the average time customers waiting in line and the average time in the system. 4

(iv) Determine the system utilisation for M = 2, 3 and 4 servers. 3

6. Write short notes on any **five** of the following : 5×4=20

(i) Scheduling

(ii) Productivity and Competitiveness

(iii) Work study

(iv) Determinants of effective capacity

(v) Value analysis

(vi) Work sampling.